THE

FOUNDRY TRADE JOURNAL

WITH WHICH IS INCORPORATED

THE IRON AND STEEL TRADES JOURNAL

VOL. 47. Thursday, August 4, 1932. No. 833.

PUBLISHED WEEKLY.

Subscription Terms: 15s. per annum.
Foreign and Colonial: 17s. 6d. per annum.
All Subscriptions are payable in advance.

All Communications to be addressed to the Editor, the Advertisement Manager, or the Publisher of
THE FOUNDRY TRADE JOURNAL,
49, WELLINGTON STREET, LONDON, W.C.2.
Telegraphic Address: "Zacatecas, Rand, London."
Telephone: Temple Bar 3951 (5 lines).

Contents.

	PAGE
International Foundry Congress	59
Quantity and Quality	59
The Allen Welded-Frame Diesel Engine	60
Cast Iron with Low-Carbon Content and Special Irons	60
Random Shots	60
Some Lifting Considerations in a Jobbing Steel Foundry	61
Developments in High-Speed Snagging Machines	62
A New Type of Dust Catcher	62
The B.C.I.R.A. Laboratories Re-Visited	63
Modern Centrifugal Dust Collectors	64
Oil-Engine Castings	64
The New Mechanised Foundry of Messrs. Ferranti, Limited	65
This Week's News in Brief	70
Trade Talk	70
Personal	70
Company Reports	70
New Companies	70
Obituary	70
A New Demonstration Foundry	70
Raw Material Markets	72
Notes from I.B.F. Branches	72
Catalogues Received	72

THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE INSTITUTE OF BRITISH FOUNDRYMEN; THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION, AND THE FOUNDRY TRADES' EQUIPMENT AND SUPPLIES ASSOCIATION.

Institute of British Foundrymen.

PRESIDENT: 1932-33:

Victor Stobie, M.I.E.E., Langholm, South Drive, Harrogate.

LIST OF SECRETARIES—

General Secretary: T. Makemson, Saint John Street Chambers, Deansgate, Manchester. London Office: 49, Wellington Street, London, W.C.2.

Birmingham, Coventry and West Midlands: L. W. Bolton, 21-23, St. Paul's Square, Birmingham.

Sheffield: T. R. Walker, 33, Ladysmith Avenue, Nether Edge, Sheffield.

Scottish: J. Bell, 60, St. Enoch Square, Glasgow.

Lancashire: J. E. Cooke, 1, Derbyshire Crescent, Stretford, Manchester.

London: H. W. Lockwood, Stewarts & Lloyds, Limited, Winchester House, Old Broad Street, London, E.C.2.

Newcastle-upon-Tyne: J. W. Eckford, 4, Mosley Street, Newcastle-upon-Tyne.

East Midlands: H. Bunting, 82, Otter Street, Derby.

West Riding of Yorkshire: S. W. Wise, 110, Pullan Avenue, Eccleshill, Bradford.

Wales and Monmouth: J. J. McClelland, 12, Clifton Place, Stow Hill, Newport, Mon.

Middlesbrough: F. A. Harper, "The Briars," Bishopton Road, Stockton-on-Tees.

Foundry Trades' Equipment and Supplies Association.

President: D. H. Wood, Titan Works, Charles Henry Street, Birmingham.

Secretary: K. W. Bridges, Grand Buildings, Trafalgar Square, London, W.C.2.

Welsh Engineers' and Founders' Association.

Secretary: E. J. Griffiths, 2, Royal Metal Exchange, Swansea.

BRITISH CAST IRON RESEARCH ASSOCIATION.

The Registered Office and Laboratories of the B.C.I.R.A. are at:—
21-23, ST. PAUL'S SQUARE, BIRMINGHAM.
Telephone: Central 1895. Telegrams: CIRA.
The B.C.I.R.A. Scottish Laboratories are:—
Foundry Technical Institute, Meek's Road, Falkirk (*Telephone 322*).

International Foundry Congress.

The programme of the World Foundry Congress and Exhibition to be held in Paris in September promises to provide an occasion of importance to all foundrymen and to be a worthy successor of the previous conferences of this character which were held in Paris in 1923, Detroit 1926, London 1929. We need not remind our readers that by mutual arrangement between all the countries concerned a truly international foundry exhibition is held triennially in centres commonly agreed upon. In the intervening periods any foundry exhibitions which are held mainly concern the country immediately involved. This exhibition is scheduled to be truly international, and will be organised in the well-known exhibition park at the Versailles gate of Paris, by the manufacturers' association and the two French associations of foundrymen. Prevailing economic conditions may restrict American participation. The Congress will open in Paris on September 13 with an evening reception, which will be followed the next morning by the formal opening at the Sorbonne. During that day and the succeeding three days there will be visits to works and technical institutions, technical Papers, and, of course, visits to the exhibition. On the last day, Sunday, an excursion has been arranged to Versailles, where, after luncheon, a reception will be held by the President of the French Republic. Ladies are invited, and it need scarcely be stated that an attractive programme has been arranged for their special entertainment.

In addition to the period in Paris, two tours have been arranged to take place before, and two tours after, the Conference. It will be possible for those attending to take, at their option, either of the two before and after the meeting. In each case visits to works and places of historic and other interest have been arranged in the district visited. Thus, the pre-Congress tours are (*a*) to Normandy, including Havre, Rouen, Caen; (*b*) to places centred round Lille. The post-Congress tours are (*a*) to the Ardennes and East France, including Charleville, Revin, Rochefort, Longwy, Luxembourg and Nancy; (*b*) to the Châteaux district of the Loire, visiting Bourges, Rosiéres, Lyons, Grenoble and concluding at Nice. This last is, perhaps, the most attractive for those who wish to make one of these tours part of their holiday.

The Institute of British Foundrymen is organising a party of British visitors, comprising members of the Institute and the British Cast Iron Research Association. By travelling as a party certain advantages are obtained, and, as far as possible, those who propose to go from this country are urged to join the party. Doubtless it will be as advantageous in forming and cementing friendships and in the promotion of business relationships as has been found on previous occasions.

It is evident from the programme that our French friends are not allowing the present state of the times to interfere with the provision they are making for the entertainment and instruction of their visitors, and we hope that as many British members as possible will participate.

Quantity and Quality.

In recent years we have had the opportunity of inspecting a number of mechanised plants for the production of castings. The word mechanisation covered by our experience ranges from "partially" to "completely," according to the quantity and complexity of the production. We believe that we are now in an authoritative position to give some views as to the quality of the castings made. In any successful quantity-production plant there is always provided some sort of safety valve. In the Cork foundry of Messrs. Henry Ford & Son there is a conveyor for ingotting and returning to the cupola stage of over-metal; at Messrs. Ferranti there is the side-bay, in which non-quantity production castings are made. In either case it permits of the melting of a slight excess of uniformly hot metal for use in the continuous-moulding section. This establishes one important point. Then inspection is effected so quickly that, should any defects appear, the trouble can be traced and remedied quickly. Speed of production has a still further bearing on quality. It obviously punishes both moulding and box plant, but as deterioration sets in so rapidly it is patent and immediately rectified. Again, there being no time available for patching up moulds rendered slightly defective through either bad patterns or poor sand, the best brains must be available for the provision of something approaching perfection in both these items. With the coming of the mechanised plant there has been an elimination of backing sand, and production is now dependent on "system" sand. The amount of study devoted to the provision of suitable mills is now receiving its reward, and to-day properly prepared "system" sand is in every way equal, if not superior, to the facing sand normally used, and, moreover, it is never allowed to deteriorate. With the provision of high-grade patterns, controlled composition and temperature of the metal used and a controlled sand supply the mechanised foundries are producing castings of a quality equal to any ever produced by rule-of-thumb methods. As complete mechanisation is beyond practical politics for the majority of foundries, the question arises as to whether they can consistently maintain a quality equal to those produced in quantity. As a conveyor has no influence, it is obvious that once correct moulding conditions have been established for any one job, the provision of suitable pattern equipment, metal and sand will guarantee the same results. These three factors are realisable by the majority of foundry owners and controlled by more than most people would imagine. As for handling and the easier control of these factors, we find that most managers have their schemes almost cut and dried ready for launching as soon as they can obtain the necessary grants from their directorate.

The Allen Welded-Frame Diesel Engine.

Our contemporary, the "Motor Ship," in its current issue, describes the novel method of construction adopted in a new lightweight type of Diesel engine to be introduced for ship's generating sets. These engines of the airless-injection type have been designed by W. H. Allen & Company, Limited, and several are under construction and undergoing test-bed trials at their Bedford works. The frames comprising the main structure are welded in order to reduce the weight. An indication of the system employed is to be derived from the accompanying sectional view. The framework is formed of steel plates of an I-section, and it will be seen that the plates forming the whole structure curve round leaving a gap in front of the engine. The gap is covered by a removable plate extending the whole length of the engine and provided with longitudinal strips which fit neatly over corresponding flanges on the main structure. This front plate materially adds to the stiffness of the structure as a whole. The gap in front of the engine allows the crankshaft to be moved sideways rather than endways, and the closing plate has suitable apertures allowing of access to the bearings. These apertures are

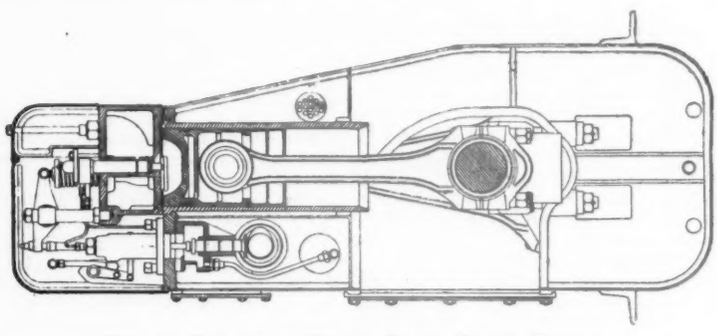


Fig. 1.—The Allen Welded-Frame Diesel Engine.

closed with aluminium doors. The entire frame is designed so that none of the main welds is in tension on account of the stress due to combustion. The camshaft bearings are part of the frame itself and the fuel pumps are carried on the top plate supporting the cylinder.

The top part of the framework carries cast-iron cylinder liners and a square sectional cylinder cover containing the inlet and exhaust valves, together with a centrally-arranged fuel valve. The piston and rings are of cast iron, the former being specially lightened and stiffened and provided with a deeply-dished crown.

The engine constructed has six cylinders of 200 mm. (7⅞ in. dia.) diameter and a stroke of 275 mm. (10¾ in.) The rating is 150 b.h.p. and a speed of 550 r.p.m. In the case of ship's generating units, it is estimated that with cast-iron pistons at a speed of 450 to 650 r.p.m., the weight will be 50 lbs. per b.h.p. The high-speed type for special requirements will weigh half this amount at a speed of 900 to 1,000 r.p.m. It is stated that the fuel consumption does not exceed 0.39 lb. per b.h.p. per hour and the lubricating oil expenditure is estimated at 0.007 lb. per b.h.p. per hour with the plant running at full load. There seems no doubt that a future lies ahead for this form of construction and foundrymen, as well as engineers, will follow its development very closely.

Clyde shipbuilders are hopeful of securing a share of the naval work to be allocated shortly. They are also hopeful that a number of inquiries for mercantile vessels will result in the placing of a few orders in the near future. The new tonnage booked during July has for the first time for many months exceeded the tonnage launched.

Cast Iron with Low-Carbon Content and Special Irons.*

Discussions often arise over the subject of cast iron of low-carbon content, and many appear to have begged the question. In 1909 a metal was produced having a carbon content of 2.50 per cent. without any recourse to special slag composed of limestone and sand.

The cardinal factor is to calculate the bed coke and to use charges of lightish weight, so as to ensure quick melting conditions, and also to utilise a receiver if a very large quantity of metal is required. To-day it is more practicable to replace the forehearth by a rotary furnace, which maintains heat of the metal and ensures homogeneity.

The charge should be made up of pig-iron and steel scrap. The absorption of the carbon by the metallic mass is not so apparent in the cupola as in the blast furnace, for with the latter cementation occurs through carbon monoxide.

Everybody who has handled a blast furnace knows that absorption of C from CO, which happens during descent of the charge, occurs at a temperature of 750 deg. C., but there may be a possible transformation of iron into cementite when the gaseous mixture contains about 95 per cent. CO.

In the cupola this is not the same, and cementation of the steel scrap is obtained through the action of carbon of the coke, together with that of the gases; that is, helped by the action of the gases. It has been proved that in cementation absorption of C by Fe cannot take place unless there are hydrocarbons present, whilst nitrogen plays an important part in the process.

The temperature of the absorption of carbon is from 850 deg. C. to 1,050 deg. C.; in order to eliminate absorption of carbon from the bed coke, a quick melt is necessary and control of the composition of the gases, which, incidentally, must not burn to the charging door.

Cast irons, having a carbon content from 2.0 to 2.4 per cent., can easily be produced by using charges constituted as follow:—50 per cent. pig-iron, 50 per cent. steel scrap. Melting should be made with from 15 to 16 per cent. of melting coke and a blast pressure of 18 in. of water. The weight of the charge should not exceed 2 cwt., and as a slag-forming material, limestone should be used. The major importance lies in rapidity of melting.

The time is not far distant when foundrymen will regard the cupola as a thing of the past, and will have installed in their foundries either fuel-oil or pulverised-fuel-fired furnaces, for, with either type, the whole range of special irons can be produced both rapidly and more economically.

The Stock Exchange Committee has granted an official quotation for the preference and ordinary shares of the Amalgamated Metal Corporation, Limited.

* Translated from "La Revue de Fonderie Moderne," June 25, 1932.

Random Shots.

It has been said that language was given to man to conceal his thoughts, but "Marksman" does not agree with the assertion—on the contrary. Pay a visit to Covent Garden, Billingsgate or Smithfield and you may be inclined to assent to "Marksman's" suggestion.

However, this question of language is continually being discussed, on the wireless or in the newspaper, and our own English tongue seems to have a ready number of critics. There is the question of the multifarious ways of pronouncing words of the same spelling—"allotropic forms," so to speak.

When in English we do speak
Why is break not rhymed with freak?
Will you tell me why it's true
We may sew but only few?
And the maker of this verse
Cannot cap his horse with worse.
Beard sounds not the same as heard,
Cord is different from word.
Cow is cow, but low is low,
Shoe is never rhymed with foe.
Think of hose, and dose and lose,
Again of goose and then of choose;
So of comb, and tomb and bomb,
Doll and roll, and home and some;
And, since pay is rhymed with say,
Why not paid with said, I pray?
Then there's blood, and food and good,
Mould is not pronounced like could
Wherefore done, and gone, and lone?
Is there any reason known?
For, in short, it seems to me
Sound and letters disagree.

* * *

There are numerous examples of this branch of the language presenting difficulties to foreigners. A Frenchman, for example, was invited to act as pall-bearer at the funeral of an illustrious English *savant*. Unfortunately he was unfamiliar with this aspect of honouring the departed; moreover, the term "pall-bearer" conveyed nothing to him. He inquired in the lounge of his hotel, "Pardon me, sair, but ze pahla bear, what he do?" "Do? Why, he sits on the ice and eats fish." Imagine his astonishment and reply, "Me then, I will not sit on ze ice and eat fish. I will not be ze polah bear!"

* * *

Then there was the Frenchman who was invited to an English golden wedding at Paris. During an interval in the proceedings he confessed he did not know what was meant by a golden wedding. "Oh," said his host. "It means just this, that this dear lady and I have lived together as man and wife for 50 years." "Oh yes," replied monsieur, "and now you are marrying ze lady."

* * *

If ever "Marksman" is elected a member of the Institute of British Foundrymen he has prepared his maiden speech in advance, and, being so pleased with it, will give the opening sentences (confidential until the occasion) so as to encourage discussion.

"Gentlemen, being a different movement from any other, this Institute demands whole-hearted support in its objects, and we, as cogs in the wheel, with our backs to the wall, should try definitely to pull our weight and so bring about the wonderful results for which we are all striving. Then, with all sails set and full steam ahead, we may at last see our way to climb the ladder of success and then swim smoothly in that harbour of peace and goodwill for which we are striving . . ."

"Marksman" would welcome any criticism in style or matter, but he sincerely hopes there will be a good discussion when that great day arrives.

Marksman.

Some Lifting Considerations in a Jobbing Steel Foundry.*

By F. J. Hemming (Member).

The lifting problems of a foundryman, and particularly a steel foundryman, are amongst the most important which he has to face, and the author has reached the conclusion that no set of lifting conditions can ever be perfect for the jobbing steel casting manufacturer. If, however, we continue to examine our difficulties and take steps to improve them, it becomes a simple matter to find points in our plant which lend themselves to better handling facilities, and each one done brings us nearer to the impossible ideal.

If the foundryman is faced with lifting his 100 tons of material for his one ton of castings, what material is he lifting and how can he economise?

Figures will show that 75 per cent. of the lifting power is completed by the time the casting is handed to the fettling shop, so that it is in the foundry where economy is more easily available. In the foundry it is not an easy matter to arrive at an analysis of lifting figures, but the writer has endeavoured through observation and data to divide this 75 per cent. of lifting power between "sand and equipment" under one heading; and "metal" under another; and these seem to work out at an average of 60 per cent. under "sand and equipment" and 15 per cent. under "metal."

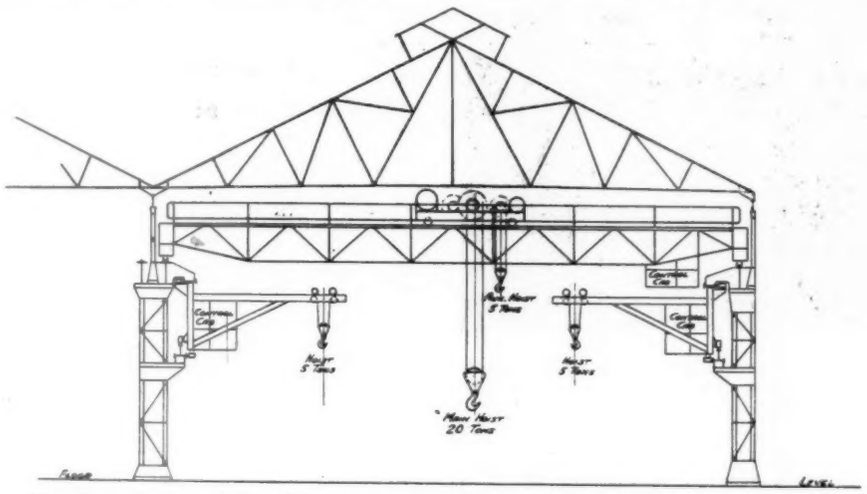


Fig. 1.—Section through Building showing Relation of Rigid Jib Side Travelling Cranes to Overheads.

The difficulties of the British steel founder during the last decade have been very different from those of his American and Continental rivals, because his market has been much smaller and far more miscellaneous. It is to the miscellaneous foundry that the writer's considerations are directed. Whether the foundry be large or small, whether it caters for large or small castings, an enormous amount of material has to be lifted to produce 1 ton of steel castings.

The author has seen it stated at various times in American papers that 150 tons is a good average weight of lifted material to consider in the production of one ton of steel castings, and, whilst a figure of an accurate nature is almost impossible to obtain, some data we have worked out in our own works shows that 100 tons may be considered a very low estimate. It is possible to obtain fantastic figures on exceptional types of work, but whether one takes minimum or maximum figures, it cannot be denied that lifting power and its application is one of the most important factors in economy of production, if indeed it is not *the* most important.

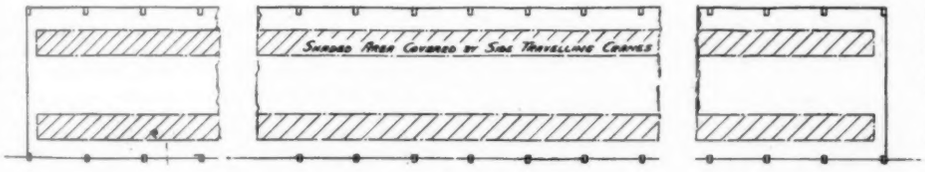


Fig. 2.—Ground Plan of Building showing Floor Area covered by Rigid Jib Side Travelling Cranes.

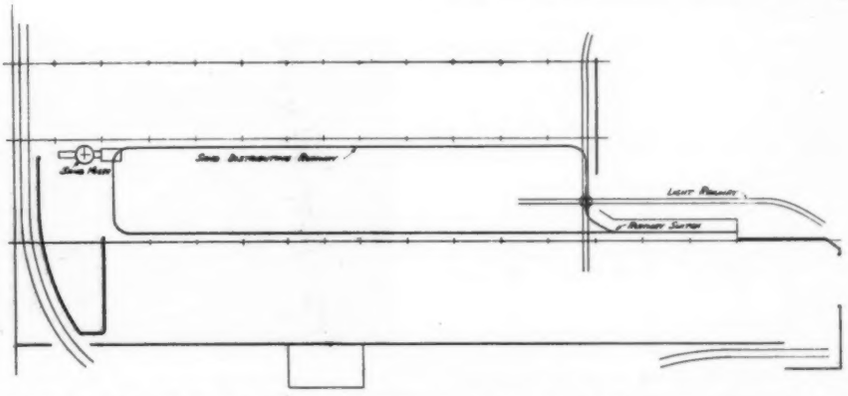


Fig. 3.—Ground Plan of Building showing Lay-out of Distributing Runway for Moulding Sand.

Cost of Crane Handling.

With labour costs in a steel casting about 50 per cent. of its total cost, the most vital consideration of all is the combination of labour and lifting power. One must dismiss the cost of lifting power without much thought, because the cost of running a 15-ton crane is only about 3d. per hr. for power and about 6d. per hr. for depreciation and maintenance on a liberal scale. What therefore really matters is lay-out and flexibility of lifts. Ample floor space or economy of floor space suggests itself as being a special lifting consideration. Labour, which is a vital cost, is then given the highest possible mobility and the least wastage of time. The question of obtaining flexibility of lifting power is extremely difficult for the foundry whose variety runs from a 10-ton casting to a few hundredweights, but even in old-established foundries it is possible to introduce methods of lifting power which do not demand high capital expense.

One must remember that on a 10-ton casting there is a range of lifts from possibly 25 tons to a few hundredweight; and on a small casting there may be a range of lifts from 20 tons downwards, with the majority of these on the smaller scale. On every day of production it is possible to produce innumerable situations which occur, but in order to meet this wide range of lifting power on jobbing work, the writer takes the liberty of illustrating the latest developments of a lifting organisation in one of the foundries of his company, which, if examined closely, will show that it gives greater freedom of movement (Fig. 1).

Speeds Utilised.

The advantages of this system are such that it is very seldom labour is waiting for a lift by reason of the combination of the overhead crane with the two rigid side gantry-cranes. The side gantry cranes are limited to 5-ton loads, but it is found that 90 per cent. of the lifts of the area which they cover are met by them. The overhead crane, which will be observed, is provided with an auxiliary hoist for the small loads.

The speed of the main overhead cranes are as follows:—

Main Hoist.—20 tons at 12 ft. per min.
" 10 tons at 20 ft. per min.
Auxiliary Hoist.—5 tons at 40 ft. per min.
" 2½ tons at 50 ft. per min.
Cross Traverse.—80 ft. per min.
Longitudinal Travel.—250 ft. per min.

Apart from the usual magnetic brakes, the hoists on this crane are fitted with steady lowering brakes which prevent acceleration when lowering. This is an essential feature in foundry work.

Fig. 2 shows the area which this system will cover. In any foundry there is a good deal of

* Paper presented at the Newcastle Convention of the Institute of British Foundrymen.

immobile material, and this is stored in the centre away from the lifting activities so that that fullest possible use is maintained on the active area. Whilst the above lay-out may be argued as suitable for a foundry operating on a wide variety of production, there are other simpler suggestions which can be considered and carried out in lighter shops.

Runway Services.

In Figs. 3, 4 and 5 the writer has shown a light runway service which has been introduced for the production of light miscellaneous castings, the term "light" referring to castings varying from 5 cwts. to a few lbs. In a foundry of this character it will be found that lifting power is not so much a matter of overhead arrangements, and the chief commodity which

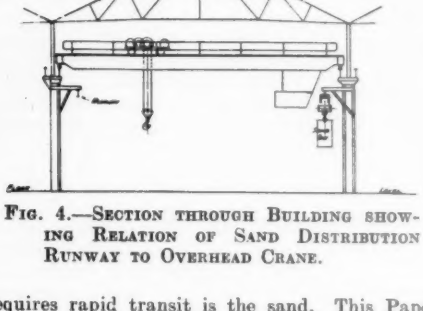


Fig. 4.—Section through Building showing Relation of Sand Distribution Runway to Overhead Crane.

requires rapid transit is the sand. This Paper is not intended to discuss the merits or demerits of a conveyor system, but to stress the necessity for possibilities of improvement to lifting problems. By the introduction of a separate sand service shown above, it has been possible to maintain continuous service to the moulder without any handicaps during the day, such as casting periods when the overhead crane will be engaged. This arrangement can be introduced into almost any foundry.

These notes have all tended in the direction of the combination of lifting power and labour, but it should not be overlooked that lifting power

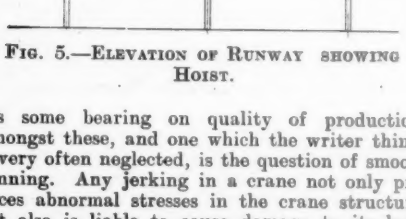


Fig. 5.—Elevation of Runway showing Hoist.

has some bearing on quality of production. Amongst these, and one which the writer thinks is very often neglected, is the question of smooth running. Any jerking in a crane not only produces abnormal stresses in the crane structure, but also is liable to cause damage to its load, which more often than not is of a delicate nature, such as a mould or core.

Experiments are being made at the present time to eliminate every possible source of jerking by a system of clipping the rails to the gantry in such a way as to allow a longitudinal expansion and contraction due to change in temperature and by electrically welding the rail joints and grinding these level. Smooth running materially assists the work of the maintenance engineer. In any foundry, maintenance costs of lifting power are higher than those working under cleaner conditions. It cannot therefore be stressed too much that one ought to see that cranes or their equivalent are designed so that a minimum of time takes place in the renewal of any wearing parts.

(*Concluded on page 70.*)

Developments in High-Speed Snagging Machines.

On a visit to the Farington Foundry of Leyland Motors, Limited, Leyland, Lancs, we were particularly interested in the developments which have recently taken place in the fettling shop. The management has replaced six double-ended grinders by a pair of modern high-speed machines using Bakelite-bonded wheels. They are shown in Figs. 1 and 2, the latter illustration showing the machine with the front panel

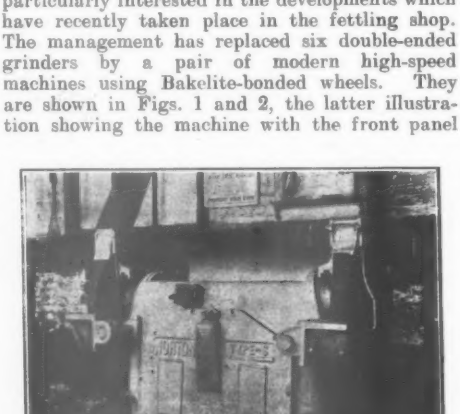


Fig. 1.—Double-Ended High-Speed Grinding Machine Installed in the Farington Steel Foundry.

removed. They have been supplied by the Norton Grinding Wheel Company, through Alfred Herbert, Limited, of Coventry. The machine is actuated by a 15-h.p. push-button-controlled motor running at 1,110 r.p.m. On a new wheel, this gives a peripheral speed of 9,000 ft. per

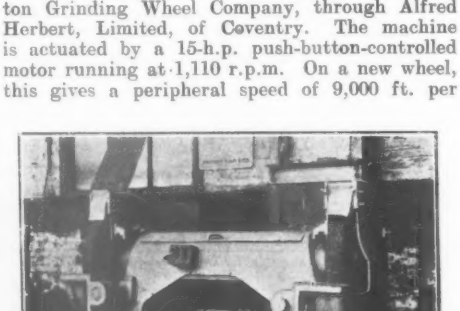


Fig. 2.—The Removal of the Front Cover Shows that Three Speeds are Available and the Compact Housing of the Motor.

min., yet, because of the high strength of Bakelite-bonded wheels, danger is virtually eliminated. As the wheels wear away, naturally the peripheral speed is reduced, but with the wear, and consequent decreased wheel diameter, comes the ability to insert a clutch, which through gearing permits the peripheral speed to be maintained at its original figure. In this way, three speeds are available to take care of wear, whilst still retaining efficiency. It is difficult to appraise the efficiency of grinding wheels, as the amount of metal removed per hour is dependent on the hardness of the castings and their shape. Even reducing the figure to rate of removal per contact hour is insufficient, as one must take into consideration the consumption of the abrasive wheel itself, but an idea may be gained by taking usage of the wheel per 100 lbs. of steel removed. With the high-speed Bakelite-bonded snagging wheels, and under the conditions existing at Leyland, this is in the order of 4 lbs. From figures submitted the life of wheel is between 350 and 400 hrs., with an average contact time of 66.7 per cent. During its life it will remove 13 cwts. of metal.

These Bakelite-bonded wheels are also used with the swing grinders. Here the management of the foundry has departed from standard practice by eliminating the suspension gear by mounting the carriage carrying the wheel and the motor on a box-like casting, whilst inserting between the two a ball race. This provides an excellent radial movement for the wheel, whilst the to-and-fro motion is accomplished by mounting the axle carrying the wheel and motor on a pair of wheels, which run in grooves machined in the side members of the carriage. We esteem this arrangement to be a decided improvement over the normal method of suspension, for a number of fairly obvious reasons.

A New Type of Dust Catcher.

The foundry industry is invariably interested in any apparatus designed to alleviate the work and expense consequent upon the settlement of cupola dust on the roofs of adjacent buildings. Messrs. Entwisle & Gass, Limited, Atlas Foundry, Nelson Street, Bolton, having solved the problem in their own foundry to their satisfaction, are now offering the method to the trade.

The principle utilised is shown in Fig. 1, wherein it will be seen that the cupola is cut off about a foot above the charging door and an

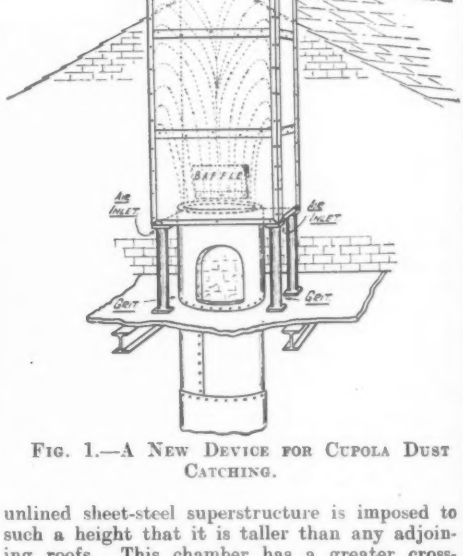


Fig. 1.—A New Device for Cupola Dust Catching.

unlined sheet-steel superstructure is imposed to such a height that it is taller than any adjoining roofs. This chamber has a greater cross-sectional area than the external area of the cupola shaft. During the blowing period the speed of the hot gases emerging from the cupola induce an upward current of air. This, together with the greater cross-sectional area, reduces the speed of the mixed gases and causes the majority of the grit to be deposited on the charging stage against the cupola stack. The following table shows the amount collected during a single blow with cupolas of various diameters:

Dia. of cupola.	Weight of melt in tons.	Weight of dust collected in lbs.
2 ft.	1	45
2 ft. 6 ins. ..	3	80
3 ft.	5	100

Such an apparatus can scarcely be standardised, and the plant is to be marketed either by the proprietors contracting for the alterations and plant or by furnishing information and plans to the trade.

The B.C.I.R.A. Laboratories Re-Visited.

It is not unnatural that the foundry industry will desire to know exactly what extra service can be given by the extension to the British Cast Iron Research Association laboratories. With this thought uppermost in our minds, we recently visited Birmingham, and found that the improvements were mainly in the direction of elbow room. Whilst mathematically there is a 60 per cent. increase in floor space, in reality that utilisable for research and its attendant necessities must have been more than doubled. Whilst before the fire, which gave rise to the change, the whole of the laboratories were cramped, whilst now there is plenty of room for the installation of new plant. Before we outline what is available for the staff, we would emphasise the need for a high-frequency electric melting furnace, an abrasion-testing machine, a simple moulding machine, a salt-spray corrosion apparatus, and a small centrifugal casting machine. We have seen far too many test-bar rupture figures in high-grade researches vitiated by the remark "defective bar." Such would be unknown when centrifugally cast. Moreover, it is possible to control more variables by this method than any other, and more comparable results would obviously be given.

Library.

We are satisfied that the Association possesses not only the finest collection of foundry literature in Europe, but, what is more important, an excellent system of classifying and making readily available the accumulated data contained therein. We doubt if it is sufficiently recognised how important it is for those investigating the properties of alloys to know exactly just what has been done both at home and abroad by other workers in the same field. It is quite common for a dozen or more books and pamphlets dealing with a certain phase of foundry practice to be made available at short notice by the librarian for the research or development staff.

Melting Shop.

There are but two furnaces available, one a small home-made crucible furnace of 70 lbs. capacity and the other a 250-lb. Morgan tilting crucible furnace. The industry may object that a cupola is essential for procuring results comparable with normal works practice. We, however, deem a cupola to be a luxury, as industrial plants can be drawn upon for large-scale experiments. For research work a better control is available in crucibles, and a still better control will be established when a high-frequency furnace is forthcoming. For the rest, the auxiliary plant, consisting of boxes, sand and patterns, is adequate for the purpose of research, except that a simple moulding machine might help to control ramming pressures.

Chemical Laboratory.

The department has been designed by Mr. F. J. Cook, the vice-chairman of the Association. It is excellently laid out, except the fume cupboards, the two compartments of which should be separated by either a space or preferably a third cupboard. We noticed that this department possessed a windmill corrosion-testing machine. Surely the proper place for such a piece of apparatus is in the research department, but we suppose the proximity to the balance room has governed its odd location. This equipment of this department is thoroughly workmanlike, and additional apparatus, such as Strahlein carbon-testing apparatus, whilst useful for advising the industry as to its merits, would add but little to its efficiency.

Research Laboratory for Physical Metallurgy.

This department is mainly concerned with the ascertaining of electrical and mechanical properties of various types of cast irons by subjecting specimens to controlled and often lengthy heat-treatments. For instance, a small experimental molybdenum wire-wound furnace is capable of superheating liquid metal up to 1,600 deg. C., whilst resistance furnaces controlled at any predetermined temperature, utilising different gases in its interior, permit of observations of the behaviour of materials under any high-temperature condition. Naturally, such work requires a certain amount of auxiliary for the control of variables. Adequate apparatus is available for studying the thermal history of alloys from the liquid state to room temperatures.

Mechanical Testing.—In this department there are the necessary machines for preparing test-bars and equipment for determining the tensile, transverse, compression shear, bend, hardness and shock tests. Much of this work can be carried on the 20-ton Ainsler machine which has been installed. For Brinell-hardness determinations a Johnson type of machine is used. In this case it is interesting to note that a tool made from tungsten carbide is being used to produce an impression in character similar to, but larger than that associated with diamond machines. For repeated-impact and shock-tensile tests a Stanton-type machine is used. A novel bend-test machine and a tensometer complete the testing equipment.

Lastly, there is the metallography laboratory. It is equipped with Reichert metallurgical microscope and a Swift photomicrographic camera. The adequacy of the plant is amply demonstrated in the excellent photomicrographs illustrating the work published by the staff of the Association.

In conclusion, we deem it necessary to point out that only a portion of the work done by the Association is carried out in these central laboratories. Its work is augmented by the branch laboratory in Falkirk; by work done in the laboratories of the Universities—especially Sheffield and by large-scale experiments performed in the works of its members. Like all other progressive organisations, it has received a certain amount of adverse criticism, but just as Savile Row is a national advertisement and sets a standard for the rest of Britain, so to the British Cast Iron Research Association is good publicity in foreign markets for the British ironfounding industry, whilst nationally it makes the whole industry, from top to bottom, think a little more deeply of the properties of their raw materials and finished products. It helps industry indirectly by focusing attention to modern thought and practice. Direct benefits have been so eloquently stated by its officials through these columns that their catalo guing would be mere repetition.

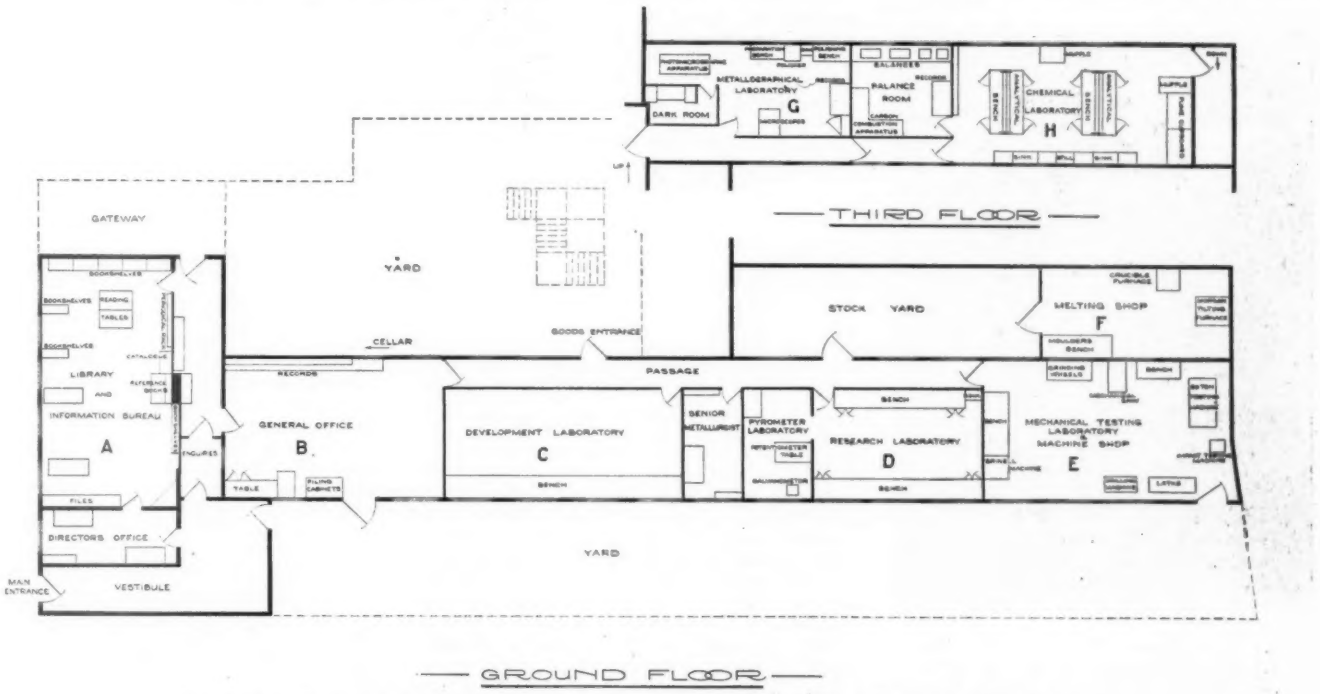


Fig. 1.—Lay-Out of the New Laboratories of the British Cast Iron Research Association.

Modern Centrifugal Dust Collectors.

SOME NOTABLE INDUSTRIAL INSTALLATIONS.

It has now been proved by extensive experience in power stations that the amount of dust in chimney gases is serious, whether mechanical stoker or pulverised-fuel firing is used. Thus anything from 0.25-15.00 per cent. by weight of the coal (or coke) is discharged as dust from the top of the chimney, and 5 to 10 per cent. is quite a common figure, although pulverised fuel is generally worse in this respect than mechanical stoking. Much, however, depends on the ash content, and with hand firing the figures are also very high.

The problem of dust removal from chimney gases can now, however, be regarded as solved, and the matter is equally important for industrial boilers of the cylindrical or water-tube type as well as other furnace work.

The main pioneers in this field are Messrs. Davidson & Company, Limited, of Belfast, who

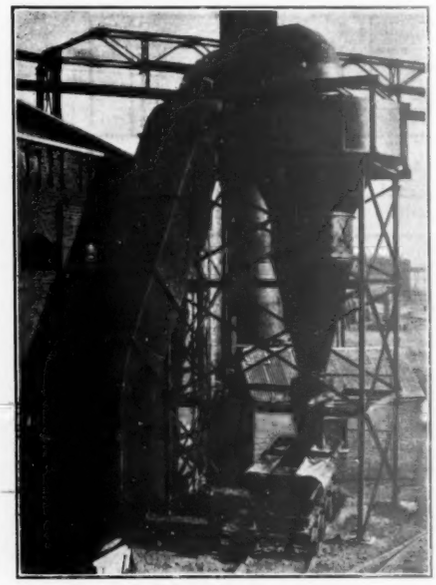


Fig. 1.—Davidson Patent "D" Type Dust Collector applied to "B. & W." Boilers at the Beckton Works of the Gas Light & Coke Company, London, burning Coke Breeze, 17 tons of Dust per Week being separated.

a number of years ago perfected their centrifugal type of dust collector, after extensive laboratory and large-scale experimental work, and are now applying it also to prevent the equally serious problem of induced draft fan erosion caused by the sand-blast action of the suspended dust on the fan casing. Over 500 of these dust collectors are already operating on power station and industrial boiler plants, and in spite of the huge volumes of combustion gas that have to be handled, about 500,000 cub. ft. per ton of coal burnt, at say 250-450 deg. F., the efficiency obtained is such that 85-95 per cent. of the total dust in the gases is being separated, in spite of varying dust concentrations and size of particles. Also much of the separated material is below 20 microns in size (1 micron equals one-thousandth part of a millimetre) practically in the "smoke" stage.

Three general designs of these collectors are available, that is the "D" (direct) the "S.P." (shunt pressure) and "S.S." (shunt suction) types, but the basic principle is the same. The "D" type for example, of which the other two are modifications, consists of a horizontal casing of volute shape, into which pass by fan suction according to the latest principles of application, the dust-laden gases which travel round at high velocity. As a result the heavier dust is thrown to the outside by centrifugal force, while because of the volute shape this pronounced separating action gradually increases as the radius of the casing diminishes. Also gravity plays a part in the matter, and from the top the dust-free gases pass out by a trunk leading to the suction of a fan which discharges to the chimney, whilst at the bottom of the volute casing is a large diameter cone, terminating in a dust outlet, leading to a closed collector-chamber.

A notable industrial application is a "D" type collector operating on a "Babcock & Wilcox" water-tube boiler at the Beckton Works of the Gas Light & Coke Company. This is burning coke breeze on chain-grate stokers, with mechanical forced draft, and the collector is catching 17 tons of dust a week, all of which of course had hitherto been discharged to the atmosphere.

As regards standard "Lancashire" boiler application, typical is an installation of the "S.P." collector at the works of Siemens Bros., Limited, Woolwich (London), operating on six boilers, 30 ft. by 9 ft. 3 in., and in this case one ton of flue dust is caught per ten-hour shift.

Oil-Engine Castings.

Only a few points of general interest can be culled from the report of the discussion on Mr. Herbert E. Beardshaw's excellent Paper on "Some Aspects of Oil Engine Foundry Practice."* A vote of thanks was unanimously accorded to the lecturer, on the motion of Mr. A. L. Key, seconded by Mr. A. Sutcliffe.

The Branch-President, Mr. Ellis Flower, who opened the discussion, said that Mr. Beardshaw had proved that a foundry, very often with crude tackle, could, and did, work to finer limits than they were often given the credit. Referring to the difficulty the foundry industry generally had to contend with owing to certain materials used in the production of castings being ordered by some inexperienced person in the office without first consulting the foundryman—a state of things applying to many foundries, if the position were reversed and the foundry manager ordered material for the office, how ridiculous it would sound.

Mr. A. Brierley asked whether holes were bored in the rim of the wheel after casting, in order to effect proper balance.

Mr. Beardshaw replied that the executive of his firm were opposed to such practice. The wheel must appear perfect as well as be perfect, and imperfect castings were scrapped.

Mr. A. Sutcliffe drew attention to the fact that there were vents in the oil-sand cores, yet many still asserted that such practice was unnecessary. He was impressed by the author's description of the core and control of the charging methods in his foundry.

Mr. Beardshaw replied that he was on the charging stage the whole of the time the cupola was being charged with iron and fuel. He saw every item of material that went into that cupola from start to finish, as it happened to be a specialised part of his job.

Mr. Masters said on many occasions he had had the privilege of seeing this process in operation. It appealed to him as a foundryman because it was a system by which intricate castings were being consistently produced by scientific control. The men to be particularly complimented for what they had done in that connection were Mr. Beardshaw and his colleagues Mr. Hunter and Mr. Swann. Mr. Beardshaw had particularly applied himself to bringing it to perfection. Even with this scientific control they did not make all good castings, but they were getting nearer perfection than any other foundry that he had seen. If a casting took two seconds more than the scheduled time to cast—suppose it was 53 seconds instead of 51, they had good reason to be doubtful about that casting because they had proved it from previous experience. The methods of charging the cupola were quite ordinary except that they controlled very carefully the analyses of all the material which went into the furnace. Mr. Beardshaw had mentioned that he had the utmost difficulty in getting iron below 3 per cent. carbon from the cupola. Obviously, if the foundry had to run castings $\frac{1}{8}$ and $\frac{1}{4}$ in. section in the same casting he was attempting something that demanded scientific control.

A Member said disparaging reference had been made to the old-fashioned foundryman. In justice to that individual it should be pointed out that although he had not the scientific control, which had been described, he was skilful in his own way and did good work. A man who ran a foundry successfully needed to have many qualities—those of a metallurgist, salesman, accountant, coremaker, moulder and melter.

Mr. Beardshaw said the foundrymen of the old days was no doubt an admirable workman. But he had his defects. As an example, take sand examination. In the old days the foundryman would get hold of the sand, feel it, and say, "That is all right." No doubt it was right from his point of view. But if he had to do the same thing a few days later he had nothing to guide him, because he had no record of his past experience and his touch might not be so discriminating. What had been aimed at in the work he (Mr. Beardshaw) had described was the institution of standards by reducing experience to something which could be put on a card and filed or which could be measured or recorded. All the measurements he made and recorded were the results of the work of foundrymen. Analysing what he had said in the lecture, it would be found that it simply reduced experience and knowledge to a basis which could be written down and so made available for future use. There were foundries in which it was not possible to have scientific control he advocated, but then such foundries were not really in a position to produce the type of casting outlined.

Regarding the sprayer body casting that had interested members, a number of castings were made by various people and by various methods. All had a distinctive mark indicating their origin. Irrespective of these marks—the men in charge of the department did not know what the marks meant—and 30 of the best were picked out. Of these 29 were Gardner castings. It was a little difficult to say, as such castings were a plate job, made under almost quantity-production conditions. However, there were rarely more than a dozen rejects out of a batch of 500. There was no reason why all the 500 should not be good, owing to the methods applied.

Mr. F. G. Bird said Mr. Beardshaw had stated that he cast some flywheels very slowly and the metal set almost immediately. Then he stated that in making castings with low-carbon iron he found that, due to the short setting range the gases in the metal were trapped and the casting was defective. How was it the flywheel casting was not defective when run in that slow manner?

Mr. Beardshaw replied that, when referring to carbon trouble, he did not mention flywheels. He could cast flywheels successfully with a low-carbon iron, but he referred specifically to cylinders and liners when considering the traped gas—a very different proposition.

* See Foundry Trade Journal, June 23, page 385.

The slag tips of Messrs. W. Whitwell & Company, Limited, Thornaby, have been purchased on a royalty basis by the Highways Construction Company, Limited, London.

The New Mechanised Foundry of Messrs. Ferranti, Limited.

The well-known progressive policy of Messrs. Ferranti, Limited, of Hollinwood, Lancashire, has naturally resulted in an increased demand for castings. This demand has been satisfied for the time being by the creation of a mechanised foundry of a high order of efficiency. It reached a sufficiently high state of completion that the first cast was made on September 22 last year. The site chosen was Bower Clough, which is on the opposite side of the railway to the main works and immediately adjacent to the railway goods yard from which all materials are drawn.

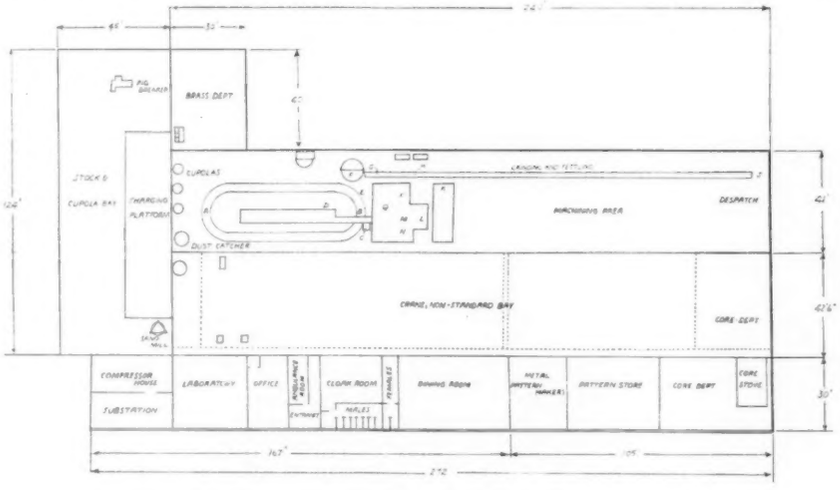


FIG. 1.—SHOWING GENERAL LAY-OUT OF THE NEW FOUNDRY OF MESSRS. FERRANTI, LIMITED.

sub-station, the laboratory, office, ambulance room, cloak room, canteen, metal patternmaking, pattern stores and core-making.

Welfare and General Conditions.

The prime requisites for the comfort and health of the operatives have received generous treatment by the management. The foundry is particularly well ventilated, and a large number of ventilators is placed along the roofs of each bay. As for lighting, the new foundry is an outstanding example of modern factory design. Of the roof, 75 per cent. is glass; both sides of the offices and laboratory are of glass, and windows of generous dimensions have been inserted in the continuous and non-ferrous bays. Efficient dust exhaust and collection systems have been provided for the sand-blast plant, the grinding machines, and the emptying stations of the continuous plant, whilst in the pits beneath the sand-preparing plant, where the hot sand from the moulding boxes is received, proper exhaust has been incorporated to free the foundry from steam and dust. The canteen, a room of 1,350 sq. ft., has been provided with a Ferranti electric water heater of 60 galls. capacity, which, apart from providing the necessary supply of water for washing up the crockery and pans, also supplies the lavatories. There is a large-size electric kettle for use in connection with tea-making and an electric oven, the top of which serves as a hot plate for the preparation of food.

The entrance to the cloak room and lavatories and elsewhere is a grate-covered trench, which unquestionably reduces the dirt carried in from the foundry by 50 per cent. It is a notion worth emulating by practically all foundries. In addition to washing facilities, the men can also bathe before leaving the foundry. At the side of the cloak room an efficient ambulance room is maintained.

Melting Plant.

Raw materials for the melting plant at present arrive by lorry on a concreted cart track, but, if later it be thought desirable, a railway siding can be introduced between this roadway and the cupola staging. Pig-iron is unloaded by 10-cwt. magnet suspended from a 3-ton overhead travelling crane and placed by the side of a Green pig-breaker. After breaking it is placed by the magnet in the pig bins, or alternatively in the bins on the furnace platform. Brand marks have been discarded in favour of a letter utilised as representing a truck consignment. Coke is tipped from the lorries, and raked or forked into self-emptying bottom-discharging skips of 9-cwt.

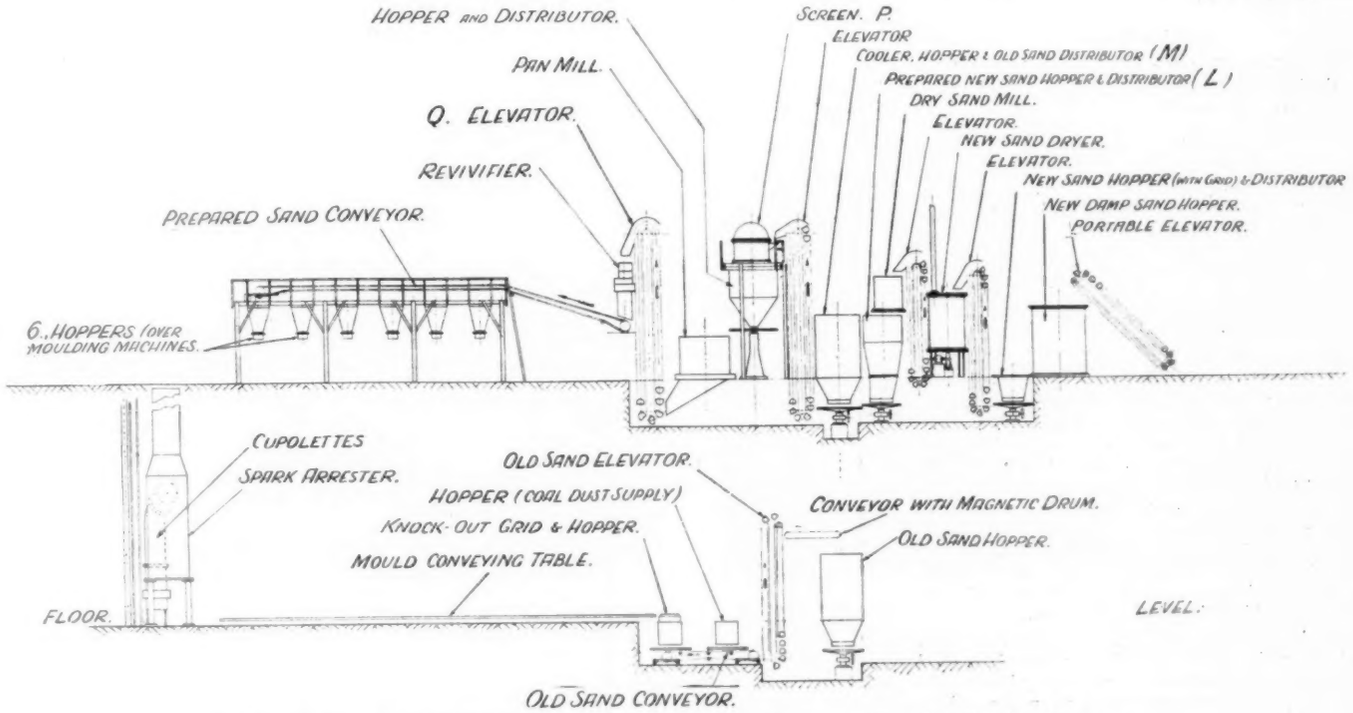


FIG. 2.—GENERAL ARRANGEMENT OF THE CONTINUOUS CASTING PLANT OF MESSRS. FERRANTI, LIMITED.

The total area of the site is 197,145 sq. ft., of which already 34,958 sq. ft. are covered by the foundry buildings, comprising the stock and cupola bay, continuous casting bay, non-ferrous bay and main bay for general and Nomag castings. Running parallel with the general crane-spanned section is a bay which is sectioned off into a number of departments, as is shown in Fig. 1. These include the compressor house, and capacity, from which it is transferred to a bin situated at the back of the waist-high pig-iron bins on the cupola platform. Moreover, it falls under the pig-iron bins.

D

Foundry scrap is transferred from the foundry in steel tipping skips mounted on a truck. The skip is lifted by the crane and discharged into the scrap bin. Limestone is similarly handled, but the ganister is loaded into steel boxes in which it may be retained or loaded into bins.

Charging Procedure.

After lighting the cupola, coke is charged by weight and to bed gauge to a determined height by means of a skip suspended from a spring balance, which can be moved along or across the stage in any direction, the main carriage running on overhead rails between cupola and the storage bins. The pig-iron is placed in a skip, according to the requirements of the charge, and the weight is indicated and registered by a spring balance pointer. Scrap is similarly dealt with, and the loaded skip is moved direct to the cupola for which it is intended, and discharged down an inclined shute. Coke is then weighed out into the skip until the pointer coincides with an indicated mark, limestone additions being similarly treated. The skip thus loaded is taken direct to the furnace and discharged. As non-magnetic cast iron is manufactured in large quantities, a number of complications are thereby introduced. For instance, such scrap cannot be handled by the magnet, and use is made of the tipping skips for raising the material to the furnace platform.

Another difficulty has been overcome by the introduction of the pig breaker, as before its incorporation in the cycle of manufacture, Nomag metal had to be cast either in very light sections or broken whilst hot. Sections up to 7 in. by 5 in. are now readily broken by the pig breaker. Yet previously, these would have had to be dealt with by the falling of a heavy tup. The tup has been retained for breaking down large scrap or hematite sows of excessive section, which will not pass into the jaws of the breaker. In this connection, the magnet is much more satisfactory and safer than the old-fashioned rope-controlled mechanical release of the tup.

Melting Plant.

Three 24-in. diameter cupolas supply metal for all duties except the larger type of castings. These are quite capable of yielding 25 cwts. or even more per hour. Two are worked on alternative days from 7.55 a.m. to 5.30 p.m., the blast being shut off, after draining the furnace, for the midday stoppage. They provide metal sufficiently hot and fluid to run castings $\frac{1}{16}$ in. thick throughout the period of their operation. Owing to the great variation in weight and dimensions of the castings manufactured, the melting speed has to be varied to suit the demand. There is, however, a compensatory factor arising from non-standardised castings, made from plates, machines and loose patterns in parts of the shop, other than the continuous plant.

The third furnace is worked in the afternoons, and provides metal for castings in medium- and low-silicon cast iron and for Nomag, which is a high-nickel, non-magnetic cast iron which is utilised by electrical engineers in large quantities for resistance grids and other purposes, such as bus-bar chambers, switch chambers, alternator end rings, coil supports and end plates. Nomag is an ideal material for use in the manufacture of the parts because it is both non-magnetic and possesses a high-electrical resistance.

All the cupolas are of the drop-bottom type, and after the doors have been released, a steel truck is run underneath to receive unburnt coke and slag. After transference to a tip, where coke and any iron are reclaimed, the slag is utilised for levelling up the adjoining land belonging to the foundry.

Above the three cupolas is a slightly inclined brick-lined culvert, 2 ft. 6 in. diameter, which connects to a 6-ft. dia. steel chimney. Dust and sparks are retained by the chimney, which is coned at the bottom and supported on pillars. At the base is a horizontal door for extracting the dust so collected.

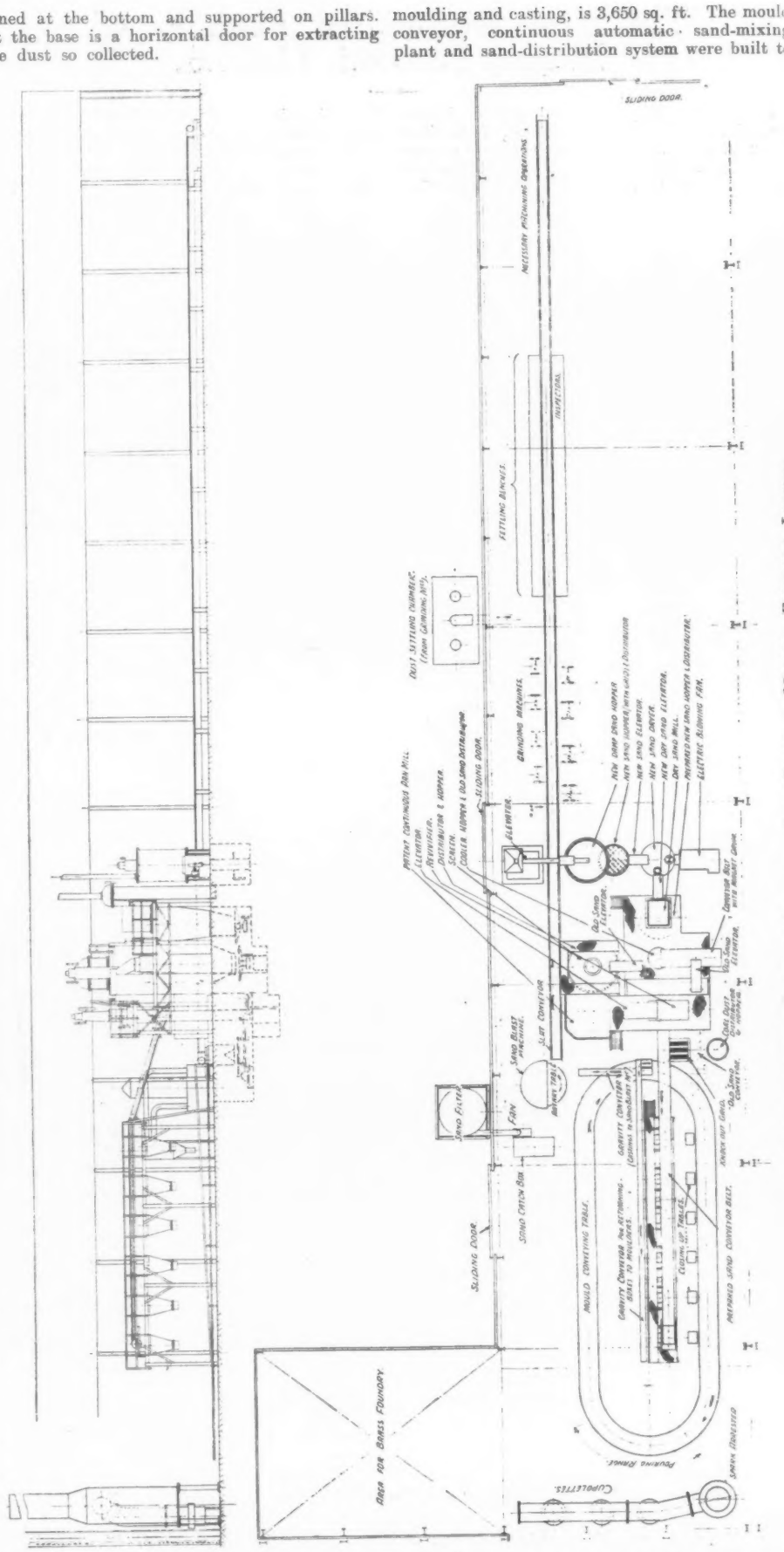


Fig. 3.—Arrangement of Automatic Sand Plant of Messrs. Ferranti, Limited.

The Continuous Plant.

The area occupied by the continuous plant, that is, the space utilised for sand preparation, moulding and casting, is 3,650 sq. ft. The mould conveyor, continuous automatic sand-mixing plant and sand-distribution system were built to the designs of M. Alfred Baillot, and supplied by Messrs. J. B. Corrie & Company, Limited. Moulding is carried out on six Osborn jolt-ram

turnover machines, which are giving 1,500 to 1,800 complete moulds made in standardised boxes of 17 in. by 11½ in. per day of 8½ hrs. A box may carry from one to 24 castings, and demand from one to eight cores per box. Additionally, there are four pairs of hand-rammed plate-stripping machines, which manufacture from 120 to 180 complete moulds per day from each, varying with the size of the box.

The moulds are placed on the mould conveyor, which consists of a series of plates arranged to form a continuous flat surface. The plates are to the casting station, that is, they travel through a half-circle to the end of the conveyor nearest the cupolas, shown at A, Fig. 1. A simple yet extremely effective quick-release clamp holds the box parts together during casting. It is fabricated from tempered spring steel, and is the subject of a patent application by Messrs. Ferranti, Limited.

Pouring Moulds on the Conveyor.

Metal from one of the three cupolas is tapped into ladles of a maximum capacity of 200 lbs., verse. Two ladles are demanded, because the majority of the moulds are required to be poured at each end simultaneously. The ladles return via a second junction and any over-metal is poured into ingot moulds ranged along the sides of the single return track. Arriving at the cupolas, they are lowered and placed in position ready for refilling.

Emptying the Boxes.

By the time the boxes reach the other end of the conveyor, shown at B, Fig. 1, they have

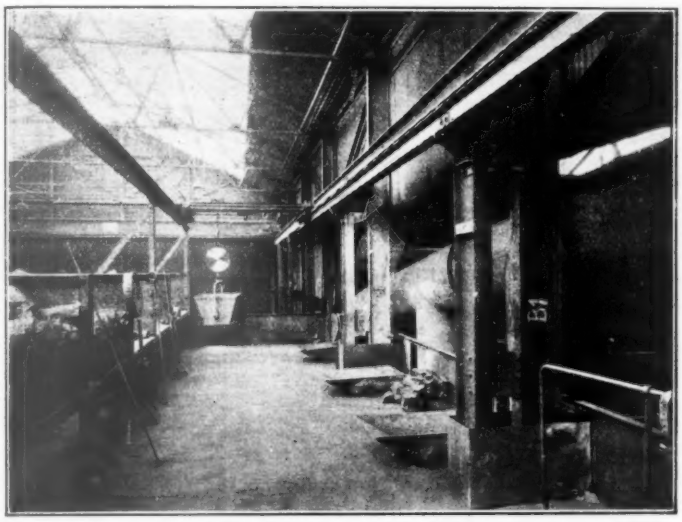


Fig. 4.—Cupola Charging Platform, showing some of the Pig Bunkers, with, below, the Coke Bunker. On the Right are the Shutes to the Cupola Charging Holes.

Fig. 5.—Melting Equipment: On the Left is the Large Cupola and next to it the Dust Extractor. In Front of the Three Small Cupolas is the Overhead Monorail System for Transporting Metal.

mounted on bogies, the wheels of which run on a narrow-gauge rail track. The drive is by means of short tractor chains situated in the centre of each track, and driven by an electric motor of 3 B.h.p. One of the advantages claimed and is carried by a pouring device suspended from a monorail.

Ladles full of metal are raised to the correct casting height by means of a lever operating a ratchet quadrant, and are pushed along the travelled about 148 ft., a length which will accommodate from 60 to 90 boxes, and they are sufficiently cool for emptying. A man operating a compressed-air hoist causes it to grip the lugs of the boxes by means of a special arrangement

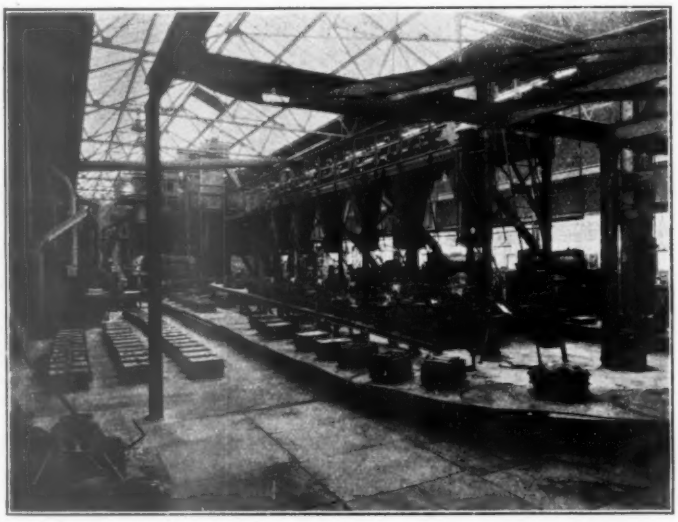


Fig. 6.—Continuous Casting Plant, showing the Mould Conveyor and the Gravity Roller Conveyor, along which Boxes are returned to the Machines. The Sand Hoppers and Sand Conveyor above are clearly shown. On the Left are the Two Sand-Blast Machines and at the Back is the Sand-Preparing Plant.

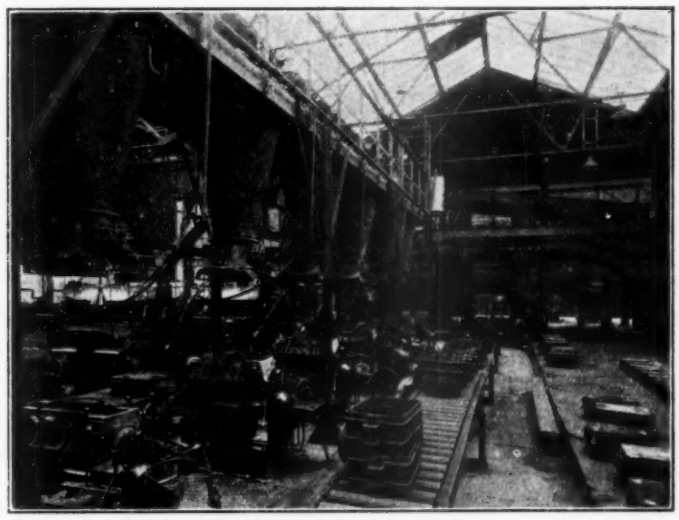


Fig. 7.—A View of the Continuous Casting Plant, showing the Overhead Hoppers, fed by Conveyor Belt from the Sand-Preparing Plant, and the Jolt-Ram Turnover Machines.

for this type of conveyor is that the men employed on pouring the metal can mount the table and travel on it in perfect safety. The speed of the mould conveyor can be varied from 6 to 22 ft. per min., and the moulds pass along monorail to a junction. Here one ladle proceeds to an inner and the other to an outer monorail, following the arcs formed by the inside and outside of the mould conveyor. The conveyor moves in a clockwise direction and casting in the re- provided with trunnion jaws, which allow boxes to be turned over in cases where the bottom parts carry bars. The box is then quickly hoisted, moved over a special knock-out device, placed at C, Fig. 1, and lowered. As the lifting

Fig. 3.—Arrangement of Automatic Sand Plant of Messrs. Ferranti, Limited.

device is relieved of the weight, the jaws open and lowering is continued, the hoist being again drawn over the track of the boxes and the operations repeated.

Meanwhile, two or three jolts suffice to empty the castings and sand on to an inclined grid, which allows the sand to pass back to sand-preparing plant for treatment for re-use. The castings and their runners are delivered down the grating to a bench about 2 ft. high, where the runners are removed and pushed off to the left to a steel skip, which, when filled, is re-

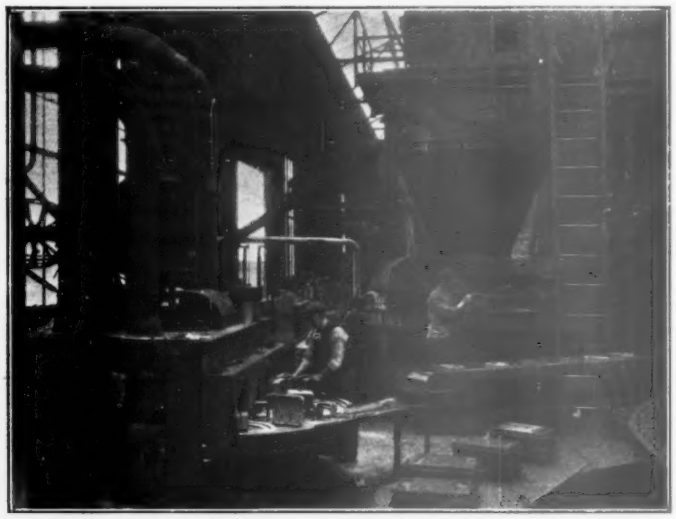


Fig. 8.—Showing the Continuous Sand Mill, together with the Main Sand-Hopper. The Castings Conveyor is on the Right, and from here Castings pass to the Sand-Blast Machine and thence by the Conveyor in the Background to the Fettling Benches.

turned to the charging bay. The empty boxes are returned along a gravity roller path, indicated at D, Fig. 1, to the moulding machines. The castings, minus the runners, are pushed to the right on to a horizontal slat conveyor (E, Fig. 1), which carries them to a standard 87-in. rotary-table sand-blast machine, indicated at F,

Fig. 10.—Main Crane Bay, showing, in the Foreground, the Two Pneumatic Jolt-Squeeze Moulding Machines.

Fig. 1. From the sand-blast machine the castings are placed on a slat conveyor (G, Fig. 1), which takes them past the checker (H, Fig. 1), who gives them a preliminary inspection. By an arrangement of press-button meters, the number

of castings of each kind passing is recorded, whether good or faulty. The latter category are marked and remain on the conveyor to the end (shown at J, Fig. 1). Good castings go forward for a preliminary gauging, grinding off the gate marks, dressing (if this be necessary), and final inspection prior to passing to the milling, tapping and drilling machines, from which, as each is completed, they are stacked in tiered trucks. These are wheeled into a special low wagon drawn by a tractor, and transferred in batches of six trucks to the assembly works.

Defective Castings.

Defective castings discovered by operators or inspectors along the line are marked and replaced on the conveyor, being collected, sorted and classified at the extreme end as mis-run, broken, dirty and so on, and the responsibility is assigned. The checker and the continuous plant superviser thus have early opportunities for tracking defects and are able to warn the sections of operatives concerned, in addition to taking such precautionary measures as may be indicated.

Handling of New Sand.

New red sand as received is stored in a large cylindrical hopper installed at the position K, Figs. 1 and 2. If it be in a fairly dry state, it can be passed direct to the dry-sand hopper installed at L, Fig. 1, and also in Fig. 2, which more clearly defines the sand-preparing plant. From the dry-sand hopper it is discharged by means of a distributor plate to the old-sand distributor (M, Figs. 1 and 2). In bad weather, when the sand is liable to arrive in a very wet condition, arrangements have been provided for

Fig. 9.—The Long Castings-Conveyor taking Castings from the Sand-Blast to Fettling Benches and Grinding Machines on either side. On the Left are Machine Tools for Milling, Drilling and Tapping Castings.

passing the sand through a drying tower and thence by elevator to the dry-sand crusher, and thence to the dry-sand hopper.

Sand Preparation.

As the sand leaves the moulding boxes it travels via a shute to the knock-out belt

Fig. 11.—Another View of the Crane Bay, taken from the Charging Platform.

(Fig. 2). At the same time it is receiving a coal-dust supply from the coal-dust distributor. From this belt the sand and coal dust additions are elevated and fall on to another belt, and in its passage over the magnetic pulley (N, Figs. 1

and 2), at one end, all magnetic material is removed. The sand falls down a cooling tower (M), which has arms projecting from the sides, whilst in the centre there is a vertical shaft, also furnished with arms, which cause an aeration of the sand. At the foot of the tower is the old-sand distributor, which receives sand from the new-sand distributor (L, Figs. 1 and 2), and discharges the mixture, made up of old and new sand and a modicum of coal dust, into the boot of an elevator, which discharges its load, via a rotary sieve (P, Figs. 1 and 2), into the storage hopper underneath, from which the mill is fed, again utilising a distributor plate.

Milling the Sand.

The Baillot patent sand mill, embodied in the sand-mixing plant, is of unique design and is continuous and automatic in action.

Four rollers, two of which are plain cylinders, whilst two are grooved, are suspended above the bottom of the pan, which is 9 ft. in dia. and revolves at 20 revolutions per minute. Inside the pan, and at right angles thereto, are also a large number of angular and flat bars, the latter being mounted in sockets in four lines of five bars each, are adjustable for angularity by means of screws and hand wheels. These adjustable bars form the threads of a screw, and depending on the angle at which they are set the discharge of the sand through the central orifice in the pan can be regulated. Centrifugal force tends to throw the sand towards the periphery of the pan, and this tendency being overcome by the screw, or spiral action, caused by the bars, leads to thorough and intensive mixing, cooling and aerating of the sand. In this connection it is interesting to note that not more than 5 per cent. of new sand is being used, the resulting castings possessing an admirable surface. Water is added whilst the sand is on the mill distributor by a series of jets.

The discharge of each hopper supplying new sand, coal dust and floor sand can be regulated to give any desired mixture. On being discharged from the mill the sand is finally passed to elevator "Q," Figs. 1 and 2, and thence through the disintegrator to the belt conveyor feeding the hoppers over the six moulding machines and the two hoppers supplying the four pairs of hand-rammed stripping machines.

The castings produced on the plant so far have varied from a few ounces to 14 lbs., and the results obtained have more than justified the assumption that the quality of the castings made are in every way equal and usually superior to those made on the bench and floor, utilising facing and backing sand, where the conditions are such as to allow operators to improve their results by the manipulation of sand and variable ramming.

Regulation of Speed of Production.

As a guide to the machine operators, each machine has attached to it a meter which records each cycle of operations which goes to the production of a complete mould. Additionally, an electric clock, made specially for the purpose by Ferranti, Limited, has a dial 18 in. dia. carrying plain figures, and a large second hand in addition to the hour and minute fingers, enables a moulder to set a pace for himself that can be maintained instead of resorting to erratic spurts. The two men respectively operating and coring and assembling change duties every hour in order to make production less monotonous. As the quality of the pattern has a profound effect on the quality of the resultant casting, infinite care is taken to obtain a highly-finished and accurate pattern, especially when it has to serve for the manufacture of thousands of castings. It is quite common for a pattern to be used for 50,000 to 100,000 castings, and in such cases £50 to £100 may be spent, and all faces will be machined to ensure the essential accuracy. In smaller patterns, filed-up patterns are occasionally used, again depending on the accuracy demanded, or, when shape and strength allow, a wooden pattern may be used. Generally speaking, the thickness varies from 0.125 in. maximum to 0.0625 minimum.

Loose Pattern Iron and Non-Ferrous Castings.

This type of work is made in a separate bay having an area of 1,200 sq. ft. It carries a concrete floor, except at the centre, where the boxes are placed for casting. Brass and other non-ferrous alloys are melted in two 200-lb. forced-draft pit-fires. Metal for the iron castings is obtained from the near-by cupolas, and may be of the different grades of iron, Nomag or other special alloyed iron. The exhaust gases from the brass furnace are passed through a brick-lined chamber, in which the smaller ladles are dried, to the common flue serving the cupolas.

Dressing Large Castings.

Crane-handled castings and others too large to pass along the castings conveyor are dealt with in a section adjacent to the core department, as there they can be manœuvred by the crane. Medium castings are brought from the floor to this department on trays capable of holding about three barrow-loads of castings by the crane in preference to ordinary barrowing.

Non-Repetition Castings.

These are made in a bay having an area of 7,130 sq. ft. spanned by a Wharton 10-ton electric overhead travelling crane, and castings up to 5 tons in weight in ordinary, special or Nomag iron are made in dry or green sand and loam. Wherever possible, bedding-in is avoided, and reliance is placed on bolts in preference to weights, except on castings of large area. Metal is obtained from a 3-ft. 2-in. dia. cupola situated at position R, Fig. 1, and this supply can be augmented by drawing upon one of the three smaller cupolas. In addition to a number of hand-rammed stripping machines, a turnover jolt-squeeze and two jolt-squeeze machines are in use.

Core Making.

The heavier cores are made under the crane which serves the moulding floor and dried in a coke-fired stove supplied with forced draft. It is 14 ft. wide by 20 ft. long and 10 ft. high. Smaller cores are made on machines, using spent moulding sand and a special core compound. Although sea sand, bonded with oil, is used for many cores, this material is unsuitable for use in moulds made in the continuous plant on account of the effect of the spent sea sand on the quality of the moulding sand. The small cores are dried in two electrically-heated stoves, each holding two trucks. These trucks can be run under the crane and lifted by suitable hooks to a position convenient for the machine-moulders working on the continuous plant, for whom there are, in addition, suspended racks for holding three plates of cores.

Fig. 12.—Bench-Moulding and Non-Ferrous Bay. The Stoves seen on the Left are heated by the Exhaust Gases from the Fires and serve to dry Ladles, etc.

Fig. 13.—A General View of the Laboratory.

United States Steel-Making Capacity.—The American Iron and Steel Institute annual compilation of capacity, as at the last day of the year, and the new rating, for December 31, 1931, has now been issued. Monthly reports of ingot production are confined to Bessemer and open-hearth and the capacities now given, in gross tons per annum, are on that basis. These are:—Basic open-hearth, 58,505,640 tons; acid open-hearth, 897,990 tons; Bessemer, 8,070,000 tons; making a total capacity of 67,473,630 tons or an increase of 1,404,060 tons in the previous year. There is no change in Bessemer capacity, 8,070,000 tons continuing during 1931. Acid open-hearth is reduced 29,700 tons, while basic open-hearth is increased 1,433,760 tons.

This Week's News in Brief.

Trade Talk.

The Institution of Mechanical Engineers is holding its summer meeting this year in Canada and the United States of America.

Messrs. Bartram & Sons, Limited, South Docks, Sunderland, have bought the steamer "Essex Friar," of 5,200 tons, for breaking up.

Messrs. John Baker & Bessemer, Limited, Rotherham, have received an order for wheels and axles for use on the Danish State Railways.

Messrs. William Firth & Company, iron and steel and machinery merchants, have removed from 27, Cavendish Road to 8, Hillary Place, Leeds.

Albion Motors, Limited, Scotstoun, Glasgow, have secured an order to build fourteen 1½-ton flat-platform vehicles and six 2-ton flat platform vehicles for the London & North Eastern Railway Company.

The Staveley Coal & Iron Company, Limited, Chesterfield, has built and put into commission in its foundries two new cupolas of the balanced-blast type developed by the British Cast Iron Research Association.

According to a message from Berlin, an order worth 3,000,000 marks (£150,000 at par) has been given by the Irish Free State Government to the Siemens Schuckert works for new machinery for the extension of the Shannon power scheme.

Messrs. Sir W. G. Armstrong, Whitworth & Company (Shipbuilders), Limited, have secured a contract for machinery improvements and conversion to the Bauer Wach system of the "City of Khios" and another Ellerman Line vessel.

Messrs. R. & W. Hawthorn, Leslie & Company, Limited, of Hebburn-on-Tyne, have secured the contract for the repair of the liner "Euripides," belonging to Messrs. Shaw, Savill & Company, and its conversion from coal-burning to oil-burning.

Tenders for the ships of the 1931 naval programme are now being considered by the Admiralty. Orders for 22 vessels will be placed. Six vessels will be built in the Royal dockyards. The remainder of the vessels, comprising one cruiser, one flotilla leader, eight destroyers, two sloops, two submarines, one gunboat for China, and one boom defence vessel, will be constructed under contract.

The annual statistical report issued by Messrs. Jordan & Sons, Limited, shows that 5,093 new companies (108 public and 4,985 private companies) were registered in England during the half-year ended June 30, 1932. A classified list published with the report contains the following items:—Engineers, 272 companies, with an aggregate capital of £913,594; metals, 60 companies and £869,200; mines and quarries, 52 companies (£866,014).

Messrs. William Beardmore & Company, Limited, Glasgow, intend at an early date to produce their new Diesel engine on a large scale. The engine is intended for both rail and road transport vehicles, and for some time buses fitted with this engine have been running between Glasgow and London with satisfactory results. Extensive trials with buses and heavy transport vehicles have shown the engine to be very much more economical than ordinary petrol-driven vehicles.

The quarterly report of the United States Steel Corporation shows total earnings for the June quarter of $3,363,000, against $1,137,000 for the March quarter and $13,818,000 for the June quarter last year. There is a deficit of $13,235,000 in the net income as compared with a deficit of $11,877,000 in the previous quarter, and a surplus of $1,606,000 in the corresponding quarter last year. The balance for dividends shows a deficit of $14,565,000, against a deficit of $13,219,000 in the previous quarter, and a surplus of $230,000 in the corresponding quarter a year ago. The directors announce the regular quarterly dividend of 1¾ per cent. on the preferred stock. Nothing is paid on the common stock and nothing was paid in the previous quarter, while $1 was paid for the June quarter of last year.

In the course of some editorial remarks on the new British tariffs on steel imports, "The Iron Age" remarks: "It remains to be seen what measures Continental mills will take to compensate themselves for the British trade in semi-finished steel which the new tariff will cost them. They might turn to the export markets with which their late customers in Great Britain have long done business. Also, if the British steel companies give their sheet mill and other domestic rolling-mill customers preferential prices to facilitate exports, the dumping issue might be raised in steel-making countries to which such exports go. It would appear, therefore, that after its long years of memorable achievement under free trade auspices, the British steel industry will encounter difficulties neither few nor small, in trying to adjust itself to a *régime* of highly protective duties."

Personal.

On the occasion of his leaving Dunaskin, Mr. William Dalrymple, the general manager of the Dalmellington Iron Company, Limited, has been presented by the clerical and administrative staff with an aneroid barometer.

Mr. H. W. Keeble has been appointed chemist and metallurgist to Messrs. E. R. & F. Turner, Limited, and Ball Motors, Limited (Foxhall Foundry, Ipswich). Mr. Keeble has been a contributor to our columns in recent years.

Mr. W. A. Macdonald was last week presented with a chiming clock by his colleagues on the staff of the Brightside Foundry Company, Limited, Sheffield, to mark the occasion of his retirement from the position of cashier to the firm. Mr. Macdonald has been on the staff of Brightside Foundry for 34 years. He is widely known throughout the foundry industry, and for many years was honorary secretary of the Sheffield section of the Institute of British Foundrymen, and in this capacity was largely responsible for the success of the Convention held in Sheffield in 1927.

Company Reports.

John Baker & Bessemer, Limited.—The directors do not recommend payment of the half-year's dividend on the preference shares, due July 31.

Davy Bros., Limited.—Debit balance brought in, £88,261; loss for twelve months ended March 31, 1932, £22,771; debit balance carried forward, £111,032.

Vickers, Limited.—Interim dividends for the half-year ended June 30, 1932, at the fixed rates on the preferred stock and both classes of preference shares will be paid on August 26.

William Asquith, Limited.—Net profit, £18,466; brought in, £9,913; arrears of dividend for 18 months on the 8 per cent. preference shares, bringing payment down to September 30, 1931, absorbing £14,610; carried forward, £13,732.

Warner & Company, Limited.—Profit, £4,559; brought in, £556; transferred from reserve, £1,000; preference dividend, £1,991; income-tax, £1,625; dividend on the ordinary shares of 2½ per cent., £750; depreciation, £1,000; carried forward, £399.

Armstrong Whitworth Securities Company, Limited.—Net income for 1931, £67,752; brought in, £68,674; debenture and note interest and directors' fees, £56,275; provision for trading losses of subsidiary companies, £173,583; debit balance carried forward, £93,431.

Consett Spanish Ore Company, Limited.—The company received no dividend from the Orconera Iron Ore Company during the year ended June 30, and the net revenue therefore fell from £15,252 in 1930-31 to £89 in 1931-32. The directors recommend a distribution of 5 per cent.

General Electric Company, Limited. — Profit, £1,057,657; brought in, £400,880; debenture interest, £204,661; depreciation, £236,953; directors' fees, £4,495; pensions, £30,000; to reserve, £130,000; preference dividends, £252,000; ordinary dividend of 8 per cent., £180,292; carried forward, £420,136.

Stanton Ironworks Company, Limited.—Profit for year, including dividends receivable from the Holwell Iron Company, Limited, and other investments, and after providing for depreciation of plant at Bilsthorpe Colliery, wagons, etc., and for taxation and contingencies, £295,173; directors' fees, £4,618; brought in, £174,197; interest on 4½ per cent. mortgage debenture stock, £30,501; preference dividends, £19,809; final dividend of 6 per cent. (free of tax), on the ordinary shares, making 10 per cent. for the year; additional provision for depreciation, £50,000; carried forward, £250,771.

New Companies.

Jameson Engine Company (U.K.), Limited.—Capital £100. Solicitors: Allen & Overy, 3, Finch Lane, London, E.C.

Jameson Engine Company (Foreign), Limited.—Capital £100. Solicitors: Allen & Overy, 3, Finch Lane, London, E.C.

Godfrey's Ironfounders, Limited, Beehive Works, 73, Watery Lane, Birmingham.—Capital £2,000. Directors: H. E. Baker and G. H. Harris.

Cuval Components, Limited, 14, New Street, Birmingham.—Capital £3,000. Ironfounders, mechanical engineers, etc. Directors: R. Wake and E. W. Radnall.

Evan & Company (Engineers), Limited, 9, Greenfield Street, Shrewsbury.—Capital £1,000. Directors: M. I. Clutterbuck, E. E., C. H., A. V. and Rosa A. M. Evans.

Newbury Diesel Company, Limited, Kings Road, Newbury.—Capital £6,500. Oil-engine manufacturers, etc. Directors: Sir George Buchanan, Major Cazalet, F. W. and W. J. Everard.

De Bergue's Patents, Limited, Strangeways Iron Works, Mary Street, Manchester.—Capital £4,500. Manufacturers of riveting tools. Directors: A. H. Jackson, F. V. Hansford and A. N. Jackson.

Obituary.

Mr. John Meade Falkner, who during the war was chairman of directors of Messrs. Sir W. G. Armstrong, Whitworth & Company, Limited, died at his home in Durham on Friday, June 22, aged 74.

Mr. John Clark, who was well known in Sheffield steel-trade circles, died on Saturday, July 23, aged 73. A brother of Mr. George Clark, head of the firm of George Clark (Sheffield), Limited, North British Steelworks, he took an active part in the works for nearly 30 years, retiring four years ago.

A New Demonstration Foundry.

Last week, British Moulding Machinery Company, Limited, 237, Weston Street, Tooley Street, Bermondsey, S.E.1, opened up a showroom for the display under working conditions of a wide range of foundry machines. There are four moulding machines of entirely new design; two are hand-operated and have been created by the firm's engineers, and two pneumatic machines by Zimmermann, of Düsseldorf. In addition there is a new type of electrically-driven suspended riddle, a core-blowing machine and a range of vibrators for clamping on to moulding boxes for ridding them of rammed sand. We had hoped to open the visitors' book, but found that a prominent Scottish ironfounder had got there first. Now that this demonstration plant is in full working order, foundrymen are invited to call any time they are in town. The models being shown will form the subject of an article in the near future.

Some Lifting Considerations in a Jobbing Steel Foundry.

(*Concluded from page* 62.)

Conclusion.

In conclusion, the title of this Paper was merely chosen to draw the attention to the large amount of lifting work which a steel founder has to perform. Each must solve his own difficulties from his own individual experience. In the main it is set out to illustrate two simple improvements which has been the outcome of experience—(1) being the introduction of greater flexibility of lifting power in a heavy foundry, and (2) a simple expedient to meet the most pressing requirements in a light foundry. In the provision and application of lifting power there is an infinite field of possibility in every steel foundry.

S&L

PIG IRON

WE PRODUCE

IN NORTHAMPTONSHIRE
LLOYDS and ISLIP Brands
IN STAFFORDSHIRE
S.V.H. Brand

In suitable qualities for the manufacture of:
HIGH CLASS ENGINEERING CASTINGS, MOTOR CYLINDERS, LIGHT CASTINGS, RAINWATER GOODS, BATHS, RANGES, GRATES, STOVES, HOLLOW WARE and all FOUNDRY PURPOSES.

We also make Forge Iron for Wrought Iron Makers and Basic Iron for Steel Works use.

RANGE OF ANALYSIS

SILICON: ·50% to 5%
SULPHUR: trace to ·10%
MANGANESE: ·30% to 4%
PHOSPHORUS: ·50% and upwards

PROPRIETORS OF LOWICK GANISTER
AS USED BY THE LEADING IRON FOUNDERS.

STEWARTS AND LLOYDS LTD

SALES OFFICE: **BROAD STREET CHAMBERS, BIRMINGHAM.**
LONDON OFFICE: **WINCHESTER HOUSE, OLD BROAD STREET, LONDON, E.C.2.**
CARDIFF OFFICE: **HANNAH STREET, DOCKS.**

Raw Material Markets.

The iron and steel markets show no sign of recovery from their recent inactivity, little business accumulating over the holiday. Many consuming works will be idle for a longer period than usual this month, and the outlook for the autumn is not very encouraging. Export business remains at a low level, owing to the prevailing depression in overseas industries. There should soon, however, be some sort of buying movement on the part of consumers generally, as the stocks of material held by the latter are not particularly large.

Pig-Iron.

MIDDLESBROUGH.—The local official prices of Cleveland iron are unchanged at:—No. 1 Cleveland foundry iron, 61s.; No. 3 Cleveland G.M.B., 58s. 6d.; No. 4 foundry, 57s. 6d.; No. 4 forge, 57s. per ton. Only small transactions are taking place at this level. Many local foundries are using Midlands iron, favourable terms being obtainable. Shipments to the Clyde and abroad show no recovery. Messrs. Pease & Partners have damped down four blast furnaces producing foundry and forge iron at their Skinningrove works, but it is stated that work will be resumed after a short stoppage, during which the electricity supply is to be changed over to the national grid system.

Competition is very keen in the East Coast hematite market, and the new price of 61s. per ton for mixed numbers has already been shaded. In view of the present situation, doubts are being expressed as to the plans for restarting the Ayresome Ironworks of Messrs. Gjers, Mills & Company, Limited. Following the fall in prices, there has been an increase in export business, one export order reported involving 2,000 tons for August/September shipment, at a very low figure. Owing to the seasonal contraction in consumption, there is only a limited demand for West Coast mixed numbers, which remain nominally at 66s. per ton at works.

LANCASHIRE.—Owing to the irregular state of employment of the foundries, any orders being taken are mostly for small quantities for early delivery, although business has been done in one or two cases covering the next two or three months. Current offers, for delivery in Manchester or equal distance, are on the basis of 67s. per ton for Derbyshire, Staffordshire and Cleveland No. 3, 65s. 6d. for Northants, 62s. for Derbyshire forge, 84s. 6d. for Scottish makes and about 81s. for West Coast hematite. With regard to Indian iron, from 67s. to 77s. per ton, including delivery to works in this district, is being currently quoted.

MIDLANDS.—The ironfoundries in this district are suffering severely from the slump, and the majority are taking an extended holiday, in the hope that there will be some accumulation of orders for them to resume work upon. Quotations remain at 62s. 6d. for Northants No. 3 and 66s. for Derbyshire, Lincolnshire and North Staffordshire No. 3, including delivery to Birmingham and Black Country stations.

SCOTLAND.—The demand remains very limited, there being only one blast furnace in Scotland producing foundry iron. Quotations remain at 69s. 6d. per ton for No. 3 Scottish foundry, f.o.t. furnaces, with 2s. 6d. extra for No. 1 quality. No. 3 Middlesbrough is at 55s. 6d. f.o.t. Falkirk, with other English irons at slightly less. No Continental iron is being offered. Only a few tons of pig-iron per week are being shipped from the Clyde, and no early improvement seems to be indicated.

Coke.

The consumption of foundry coke at the moment is at a low level, while forward orders offer no indication of improvement, in spite of the fact that consumers can book at present terms as far as early winter. Best Durham coke is at 37s. 6d. delivered Birmingham and district, with inferior grades at 2s. 6d. less, while Welsh foundry coke is offered at prices varying from 30s. to 45s., according to quality.

Steel.

Many finished-steel works have remained inactive this week, and are hoping that orders will accumulate to some extent during the interval. Up to the present, however, there seems to be little moving, principally owing to the small demand from the heavy engineers and shipbuilders. There is no change in the situation in the semi-finished steel market. The home works continue to be undercut from the Continent. The total amount of business passing is not large, as many works are in the possession of large stocks.

Scrap.

In the Cleveland market, heavy cast iron can be bought at 35s. per ton, delivered, with good machinery quality at 36s. and light castings at 30s. to 31s. In the Midlands, heavy machinery metal is offered at 42s. 6d. to 45s., with clean light metal at 35s. 6d. delivered. Scrap prices are nominally unaltered in Scotland. In South Wales, heavy cast iron is firmer at 40s. to 42s. 6d., owing to increased activity, and machinery scrap is now firmer at 45s. to 47s. 6d. per ton delivered.

Metals.

Copper.—The market is not in a very strong position at the moment, owing to the limited demand from consumers, and refined metal has been sold at as low as 4.50 cents per lb. c.i.f. Supplies at this level, however (mostly coming from Japan), are not very large, and would soon be absorbed were there any recovery in consumption.

Closing quotations :—

Cash.—Thursday, £26 2s. 6d. to £26 3s. 9d.; Friday, £26 7s. 6d. to £26 10s.; Tuesday, £27 13s. 9d. to £27 16s. 3d.; Wednesday, £27 7s. 6d. to £27 10s.

Three Months.—Thursday, £25 15s. to £25 16s. 3d.; Friday, £26 to £26 2s. 6d.; Tuesday, £27 7s. 6d. to £27 10s.; Wednesday, £27 2s. 6d. to £27 5s.

Tin.—A considerable amount of buying by consumers was experienced towards the end of last week, both here and in the United States, much of the metal bought being for forward delivery. This partly accounts for the increase in price to £133. There was also a good deal of professional buying, rumoured to be on account of the new pool.

Official closing prices :—

Cash.—Thursday, £129 2s. 6d. to £129 5s.; Friday, £131 to £131 5s.; Tuesday, £133 to £133 5s.; Wednesday, £133 to £133 5s.

Three Months.—Thursday, £130 12s. 6d. to £130 17s. 6d.; Friday, £132 10s. to £132 15s.; Tuesday, £134 15s. to £135; Wednesday, £134 10s. to £134 15s.

Spelter.—Trade with consumers has been considerably quieter during the past fortnight, and, in view of present prospects in the galvanising industry, there is not likely to be any early recovery. However, the market has been favourably influenced by the gain in the other base metals.

Daily fluctuations :—

Ordinary.—Thursday, £12 2s. 6d.; Friday, £12 5s.; Tuesday, £12 7s 6d.; Wednesday, £12 6s. 3d.

Lead.—The price of lead has stiffened by about 30 points in the American market and consumers over there, including the cable-makers, have bought considerably. Similar scenes have followed on the London market, and decidedly more interest has been taken here.

The week's prices have been :—

Soft Foreign (Prompt).—Thursday, £10; Friday, £10 5s.; Tuesday, £10 8s. 9d.; Wednesday, £10 1s. 3d.

Working Stresses in Steel Pillars.—Messrs. Redpath, Brown & Company, Limited, the well-known steel constructional engineers, of 2, St. Andrew Square, Edinburgh, have published a small pamphlet containing tables of working stresses and formulæ to facilitate the calculation of loads on steel pillars supporting concentric and eccentric loads. The tables have been worked out in accordance with the recommendations of B.S. Specification No. 449—1932, for the use of structural steel in building, and also in accordance with the code of practice approved by the London County Council on February 16, 1932, as a basis of consideration and application under Section 22 of the London Building Act, 1930, for relief from the provisions of the third Schedule of the Act.

Notes from I.B.F. Branches.

The Lancashire Branch organised a summer excursion to New Brighton on July 2, which provided a unique opportunity for the members of the parent branch, the Burnley and Preston sections to meet, and an enjoyable afternoon and evening resulted. The three parties met at Liverpool and travelled together to New Brighton, and dinner was served at the Grand Hotel, after a number of enthusiastic members and their ladies had participated in a bowling handicap which was organised. The Branch-President, Mr. Ellis Flower, presided at dinner, supported by Mr. Roy Stubbs, Vice-President of the Institute, Mr. A. Phillips and Mr. N. Cook, Branch Vice-Presidents.

In presenting the prizes to successful competitors, Mr. E. Shackleton Bailey, M.P., expressed his delight at being able to be present, and emphasised the value of the opportunity for social intercourse offered at such functions. The benefits to the Institute and to industry generally were, in his opinion, extremely valuable. The three ladies' prizes were taken by Mrs. Burrows, Miss Key and Mrs. S. Butterworth, whilst Mr. J. Butterworth won the gentleman's prize. A vote of thanks was accorded to the President and Secretary. It was proposed by Mr. Hogg (Burnley) and seconded by Mr. A. E. Green (Preston). The President, in acknowledgment, thanked the members and Mr. Shackleton Bailey for their support. The members travelled back to Liverpool together, where they dispersed to their respective destinations. About 60 members and friends were present.

Catalogues Received.

Friction Elimination. — A four-page leaflet, received from the Hoffmann Manufacturing Company, Limited, of Chelmsford, describes a new development in friction elimination. It comprises a "contact" or load ball or roller, free to rotate about its own axis and superimposed eccentrically on a freely-rotating raceway or track—the whole being housed as a complete unit.

Refractories. — In connection with their exhibit shown on board the s.s. "Letitia"—the Scottish Canadian trade-mission ship—the Glenboig Union Fireclay Company, Limited, West Regent Street, Glasgow, C.2, issued a 12-page well-illustrated pamphlet. Buff has been chosen as the colour for the paper, with sepia ink for printing and orange used for relief. We feel it would have been improved by using black ink, as there is insufficient contrast shown. Moreover, the orange masks instead of emphasising the contrast. The lay-out is quite good, whilst the data presented are well chosen and of a convincing character.

Applications for Trade Marks.

The following list of applications to register trade marks is extracted from the "Trade Marks Journal":—

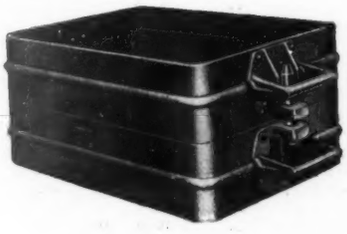
"Alcro."—Firebricks. John G. Stein & Company, Limited, Bonnybridge.

"Amplus." — Unwrought and partly-wrought metals. Sibleys (1922), Limited, 310-314, Clapham Road, London, S.W.9.

"Silvron."—Unwrought and partly-wrought ferrous alloys. Darlington Rustless Steel & Iron Company, Limited, Darlington.

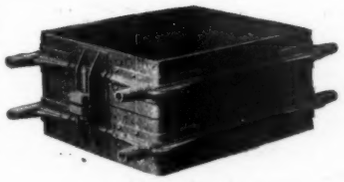
Device, with words "The P.B.C. Co., Ltd."—Unwrought and partly-wrought metals. The Phosphor Bronze Company, Limited, Summer Street, London, S.E.1.

An accident of an unusual nature occurred at the Blochairn works of the Steel Company of Scotland on Saturday. A number of men, after the works stopped, were cleaning themselves with naphtha when an explosion took place, and six men were badly burned. Three of the men had to be detained for treatment at the infirmary.



Sterling

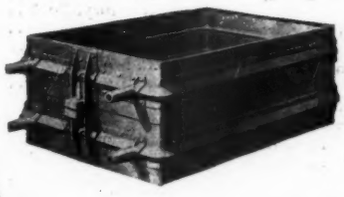
UP-TO-DATE MOULDING BOX EQUIPMENT.



STERLING
ROLLED STEEL
MOULDING BOXES

have been designed for THE MODERN FOUNDRY.

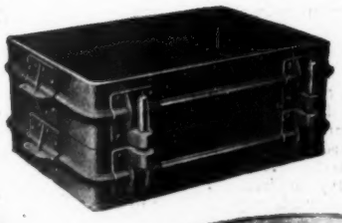
They are light and easy to handle.
Cannot crack or break.
Cannot spring.
Strong, Rigid, Durable and Permanently accurate.



BY ADOPTING STERLING BOXES IN YOUR FOUNDRY,

You will halve your moulding costs. You will increase production per man per hour, and reduce your box maintenance costs. You will turn out more accurate castings and thereby reduce your scrap and reject accounts. You will considerably reduce your fettling costs and put money into your pocket that is now running to waste.

STERLING BOXES save their cost in a few months and are obviously a sound investment for any foundry.



STERLING FOUNDRY SPECIALTIES Ltd.

Agents at:—London, Manchester, Newcastle-on-Tyne and Glasgow.

BEDFORD.

WEEKLY PRICE CURRENT.

COPPER.

	£ s. d.
Standard cash	27 7 6
Three months	27 2 6
Electrolytic	31 0 0
Tough	29 0 0
Best selected	29 10 0
Sheets	57 0 0
India	40 0 0
Wire bars	32 0 0
Do., Sept.	31 15 0
Do., Oct.	31 10 0
Ingot bars	32 0 0
H.C. wire rods	34 10 0
Off. av. cash, July	26 2 5⅝
Do., 3 mths., July	25 13 6½
Do., Sttlmnt., July	26 1 10½
Do., Electro, July	29 10 0
Do., B.S., July	28 15 10
Do., wire bars, July	29 17 10½
Solid drawn tubes	9½d.
Brazed tubes	9½d.
Wire	6½d.

BRASS.

Solid drawn tubes	8½d.
Brazed tubes	10½d.
Rods, drawn	7½d.
Rods, extd. or rlld.	4½d.
Sheets to 10 w.g.	7½d.
Wire	7½d.
Rolled metal	6½d.
Yellow metal rods	4d.
Do. 4 × 4 Squares	5½d.
Do. 4 × 3 Sheets	5½d.

TIN.

	£ s. d.
Standard cash	133 0 0
Three months	134 10 0
English	134 15 0
Bars	136 15 0
Straits	138 5 0
Australian	136 0 0
Eastern	137 17 6
Banca	143 0 0
Off. av. cash, July	125 19 5½
Do., 3 mths., July	127 12 3½
Do., Sttlmt., July	125 19 0½

SPELTER.

	£ s. d.
Ordinary	12 6 3
Remelted	11 12 6
Hard	9 15 0
Electro 99.9	14 17 6
English	13 7 6
India	11 10 0
Zinc dust	19 0 0
Zinc ashes	1 15 0
Off. aver., July	11 15 6⅜
Aver. spot, July	11 11 10½

LEAD.

	£ s. d.
Soft foreign ppt.	10 1 3
Empire	11 1 3
English	12 0 0
Off. average, July	9 19 8½
Average spot, July	9 16 4½

ZINC SHEETS, &c.

	£ s. d.
Zinc sheets, English	22 10 0
Do., V.M. ex-whf.	21 0 0
Rods	26 0 0
Boiler plates	—
Battery plates	—

ANTIMONY.

	£ s. d. to £ s. d.
English	35 0 0 to 42 10 0
Chinese	22 10 0
Crude	16 0 0

QUICKSILVER.

	£ s. d.
Quicksilver	9 5 0

FERRO-ALLOYS AND STEEL-MAKING METALS.

Ferro silicon—	
25%	8 5 0
45/50%	13 5 0
75%	19 0 0
Ferro-vanadium—	
35/50%	12/8 lb. Va.
Ferro-molybdenum—	
70/75% c. free, of Mo.	6/3 per lb.
Ferro-titanium—	
23/25% carbon-free	11d. lb.
Ferro-phosphorus, 20/25%	£21 0 0
Ferro-tungsten—	
80/85%	1/9 lb.
Tungsten metal powder—	
98/99%	2/- lb.
Ferro-chrome—	
2/4% car.	£34 10 0
4/6% car.	£25 0 0
6/8% car.	£24 10 0
8/10% car.	£23 15 0
Ferro-chrome—	
Max. 2% car.	£37 0 0
Max. 1% car.	£46 17 6
Max. 0·70% car.	£48 5 0
70% carbon-free	1/1 lb.
Nickel—80/99.5%	£230 to £235
"F" nickel shot	£207 0 0
Ferro-cobalt	8/- lb.
Aluminium 98/99%	£95 0 0
Metallic chromium—	
96/98%	2/9 lb.
Ferro-manganese (net)—	
76/80% loose	£10 15 0 to £11 5 0
76/80% packed	£11 15 0 to £12 5 0
76/80% export	(nom.) £9 0 0
Metallic manganese—	
94/96% carbon-free	1/4 lb.

Per ton unless otherwise stated.

HIGH-SPEED TOOL STEEL.

Finished bars, 14% tungsten	2s. 0d.
Finished bars, 18% tungsten	2s. 9d.

Per lb. net, d/d buyers' works.

Extras—	
Rounds and squares, 3 in. and over	4d. lb.
Rounds and squares, under ½ in. to ¼ in.	3d. lb.
Do., under ¼ in. to $\frac{3}{16}$ in.	1/- lb.
Flats, ½ in. × ¼ in. to under 1 in. × ⅛ in.	3d. lb.
Do., under ¼ in. × ¼ in.	1/- lb.
Bevels of approved sizes and sections	6d. lb.

Bars cut to length, 10% extra.

SCRAP.

South Wales—	£ s. d.	£ s. d.
Heavy steel	1 18 0	to 1 19 0
Bundled steel and shrngs.	1 14 0	to 1 18 6
Mixed iron and steel	1 15 0	
Heavy cast iron	2 0 0	to 2 2 6
Good machinery	2 5 0	to 2 7 6
Cleveland—		
Heavy steel	1 15 0	
Steel turnings	1 10 0	
Cast-iron borings	1 2 6	
Heavy forge	2 10 0	
W.I. piling scrap	2 2 6	
Cast-iron scrap	1 15 0	to 1 16 0
Midlands—		
Light cast-iron scrap	1 15 6	
Heavy wrought iron	2 2 6	
Steel turnings, f.o.r.	0 18 0	
Scotland—		
Heavy steel	1 15 0	
Ordinary cast iron	2 0 0	
Engineers' turnings	1 7 0	
Cast-iron borings	1 10 0	
Wrought-iron piling	1 18 0	
Heavy machinery	2 4 0	

London—Merchants' buying prices delivered yard.

	£ s. d.
Copper (clean)	22 0 0
Brass	13 0 0
Lead (less usual draft)	7 0 0
Tea lead	5 0 0
Zinc	5 5 0
New aluminium cuttings	72 0 0
Brasiery copper	18 0 0
Gunmetal	17 0 0
Hollow pewter	70 0 0
Shaped black pewter	50 0 0

PIG-IRON.

(f.o.t. unless otherwise stated.)

N.E. Coast—	
Foundry No. 1	61/-
Foundry No. 3	58/6
Foundry No. 4	57/6
Forge No. 4	57/-
Hematite No. 1	61/6
Hematite M/Nos.	61/-
N.W. Coast—	
Hem. M/Nos. d/d Glas.	72/-
„ d/d Birm.	84/6
Malleable iron d/d Birm.	117/6
Midlands—	
Staffs common*	—
„ No. 4 forge*	61/-
„ No. 3 fdry.*	66/-
Shrops basic	—
„ Cold blast, ord.	—
„ „ roll iron	—
Northants forge*	57/6
„ fdry. No. 3*	62/6
„ fdry. No. 1*	65/6
Derbyshire forge*	61/-
„ fdry. No. 3*	66/-
„ fdry. No. 1*	69/-
„ basic*	—

*d/d Black Country dist.

Scotland—	
Foundry No. 1	72/-
„ No. 3	69/6
Hem. M/Nos. d/d	68/6
Sheffield (d/d district)—	
Derby forge	58/6
„ fdry. No. 3	63/6
Lincs forge	—
„ fdry. No. 3	63/6
E.C. hematite	74/6
W.C. hematite	83/6
Lancashire (d/d eq. Man.)—	
Derby forge	62/-
„ fdry. No. 3	67/-
Staffs fdry. No. 3	67/-
Northants fdry. No. 3	65/6
Cleveland fdry. No. 3	67/-
Dalzell, No. 3 (special)	102/6 to 105/-
Glengarnock, No. 3	84/6
Clyde, No. 3	84/6
Monkland, No. 3	84/6
Summerlee, No. 3	84/6
Eglinton, No. 3	84/6
Gartsherrie, No. 3	84/6
Shotts, No. 3	84/6

FINISHED IRON AND STEEL.

Usual District deliveries for iron; delivered consumers' station for steel.

Iron—	£ s. d.	£ s. d.
Bars (cr.)	9 5 0	to 9 15 0
Nut and bolt iron	7 15 0	to 8 10 0
Hoops	10 10 0	to 12 0 0
Marked bars (Staffs) f.o.t.	12 0 0	
Gas strip	10 10 0	to 12 0 0
Bolts and nuts, ¾ in. × 4 in.	12 0 0	
Steel—		
Plates, ship, etc.	8 15 0	to 8 17 6
Boiler plts.	8 7 6	to 9 5 0
Chequer plts.	10 7 6	
Angles	8 7 6	
Tees	9 7 6	
Joists	8 15 0	
Rounds and squares, 3 in. to 5½ in.	9 7 6	
Rounds under 3 in. to ¼ in. (Untested)	6 12 6	& up.
Flats—8 in. wide and over	8 12 6	
„ under 8 in. and over 5 in.	8 17 6	
Rails, heavy	8 5 0	to 8 10 0
Fishplates	12 0 0	
Hoops (Staffs)	9 10 0	
Black sheets, 24g.	8 0 0	to 8 10 0
Galv. cor. shts.	9 5 0	to 9 15 0
Galv. flat shts.	9 15 0	to 10 15 0
Galv. fencing wire, 8g. plain	12 7 6	
Billets, soft	4 17 6	to 5 7 6
Billets, hard	6 12 6	
Sheet bars	4 15 0	to 5 5 0
Tin bars	4 15 0	

PHOSPHOR BRONZE.

	Per lb. basis.
Strip	10d.
Sheet to 10 w.g.	11d.
Wire	11½d.
Rods	10d.
Tubes	15½d.
Castings	12d.

Delivery 3 cwt. free.
10% phos. cop. £30 above B.S.
15% phos. cop. £35 above B.S.
Phosphor tin (5%) £30 above price of English ingots.
C. Clifford & Son, Limited.

NICKEL SILVER, &c.

	Per lb.
Ingots for raising	7d. to 1/1
Rolled—	
To 9 in. wide	1/1 to 1/7
To 12 in. wide	1/1½ to 1/7½
To 15 in. wide	1/1½ to 1/7½
To 18 in. wide	1/2 to 1/8
To 21 in. wide	1/2½ to 1/8½
To 25 in. wide	1/3 to 1/9
Ingots for spoons and forks	7d. to 1/3½
Ingots rolled to spoon size	10d. to 1/6½
Wire round—	
to 10g.	1/4½ to 1/11½

with extras according to gauge.
Special 5ths quality turning rods in straight lengths, 1/3½ upwards.

AMERICAN IRON AND STEEL.

At Pittsburgh unless otherwise stated

	Dols.
No. 2 foundry, Phila.	14.34
No. 2 foundry, Valley	14.50
No. 2 foundry, Birm.	11.00
Basic	15.39
Bessemer	16.89
Malleable	16.39
Grey forge	16.39
Ferro-mang. 80%, seaboard	68.00
O.-h. rails, h'y, at mill	43.00
Billets	26.00
Sheet bars	26.00
Wire rods	37.00
	Cents.
Iron bars, Phila.	2.11
Steel bars	1.60
Tank plates	1.60
Beams, etc.	1.60
Skelp, grooved steel	1.60
Skelp, sheared steel	1.60
Steel hoops	1.55
Sheets, black, No. 24	2.20
Sheets, galv., No. 24	2.85
Wire nails	1.95
Plain wire	2.20
Barbed wire, galv.	2.60
Tinplates, 100-lb. box	$4.75

COKE (at ovens).

Welsh foundry	20/- to 22/6
„ furnace	16/- to 17/-
Durham and Northumberland—	
„ foundry	21/- to 25/-
„ furnace	12/9
Midlands, foundry	—
„ furnace	—

TINPLATES.

f.o.b. Bristol Channel ports.

I.C. cokes	20×14 per box	15/- to 15/6
„	28×20 „	30/- to 31/-
„	20×10 „	22/- to 22/3
„	18¾×14 „	15/6 to 15/9
C.W.	20×14 „	13/-
„	28×20 „	—
„	20×10 „	—
„	18¾×14 „	—

SWEDISH CHARCOAL IRON & STEEL.

Pig-iron	£6 0 0 to £7 0 0
Bars, hammered, basis	£16 10 0 to £17 0 0
Bars and nail-rods, rolled, basis	£15 17 6 to £16 5 0
Blooms	£10 0 0 to £12 0 0
Keg steel	£32 0 0 to £33 0 0
Faggot steel	£18 0 0 to £23 0 0
Bars and rods dead soft, st'l	£10 0 0 to £12 0 0

All per English ton, f.o.b. Gothenburg.
[Subject to an exchange basis of Kr. 18.16 to £1.]

DAILY FLUCTUATIONS.

Standard Copper (cash).

		£	s.	d.		
July	28 ..	26	2	6	inc.	20/-
,,	29 ..	26	7	6	,,	5/-
Aug.	2 ..	27	13	9	,,	26/3
,,	3 ..	27	7	6	dec.	6/3

Electrolytic Copper.

		£	s.	d.		
July	28 ..	28	15	0	inc.	25/-
,,	29 ..	29	5	0	,,	10/-
Aug.	2 ..	31	10	0	,,	45/-
,,	3 ..	31	0	0	dec.	10/-

Standard Tin (cash).

		£	s.	d.		
July	28 ..	129	2	6	inc.	42/6
,,	29 ..	131	0	0	,,	37/6
Aug.	2 ..	133	0	0	,,	40/-
,,	3 ..	133	0	0	No change	

Tin (English ingots).

		£	s.	d.		
July	28 ..	131	0	0	inc.	50/-
,,	29 ..	132	15	0	,,	35/-
Aug.	2 ..	134	15	0	,,	40/-
,,	3 ..	134	15	0	No change	

Spelter (ordinary).

		£	s.	d.		
July	28 ..	12	2	6	inc.	5/-
,,	29 ..	12	5	0	,,	2/6
Aug.	2 ..	12	7	6	,,	2/6
,,	3 ..	12	6	3	dec.	1/3

Spelter (Electro, 99.9 per cent.).

		£	s.	d.		
July	28 ..	14	10	0	inc.	7/6
,,	29 ..	14	15	0	,,	5/-
Aug.	2 ..	14	17	6	,,	2/6
,,	3 ..	14	17	6	No change	

Zinc Sheets (English).

		£	s.	d.		
July	28 ..	22	10	0	No change	
,,	29 ..	22	10	0	,,	,,
Aug.	2 ..	22	10	0	,,	,,
,,	3 ..	22	10	0	,,	,,

Lead (English).

		£	s.	d.		
July	28 ..	11	15	0	inc.	5/-
,,	29 ..	12	0	0	,,	5/-
Aug.	2 ..	12	5	0	,,	5/-
,,	3 ..	12	0	0	dec.	2/6

AVERAGE MONTHLY PRICES OF CLEVELAND No. 3 PIG-IRON.

Year.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly average.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1892	37 7	35 7	36 10	37 10	39 2	40 11	39 11	39 10	40 0	38 6	37 6	37 4	38 5
1893	36 0	34 3	34 4	34 2	33 10	34 8	35 3	35 5	35 4	34 8	34 7	35 9	34 10
1894	35 8	35 11	36 1	36 1	35 5	35 5	35 5	35 11	36 6	35 8	35 8	35 1	35 9
1895	34 7	34 4	34 4	34 8	35 6	35 2	36 1	37 1	38 10	38 6	37 11	37 6	36 3
1896	37 3	38 4	38 7	38 1	37 4	37 4	36 11	36 11	37 11	39 2	40 5	40 5	38 3
1897	41 2	40 4	40 5	39 2	39 7	40 0	39 6	40 5	41 7	42 5	41 5	40 4	40 7
1898	40 9	40 8	40 8	40 0	40 7	39 11	40 4	41 11	43 0	44 11	49 1	44 3	42 0
1899	46 10	47 11	47 9	49 10	55 11	62 10	71 6	65 9	67 7	68 8	70 0	66 9	60 5
1900	67 10	68 10	73 10	76 2	74 2	68 6	69 3	71 4	70 9	67 8	63 6	53 6	68 9
1901	48 0	46 6	45 8	45 5	45 10	44 7	44 6	45 3	45 3	45 3	43 6	43 1	45 3
1902	43 11	46 7	46 9	47 11	48 10	49 7	50 9	52 1	53 6	52 9	50 9	47 11	49 3
1903	47 3	48 9	51 10	49 0	46 1	46 2	46 7	46 8	45 7	43 6	42 10	41 11	46 4
1904	42 3	42 7	43 3	44 7	44 0	42 10	42 9	43 3	43 1	43 9	46 1	48 7	43 11
1905	48 11	48 0	49 6	50 1	51 5	45 6	45 9	47 5	48 8	52 11	52 9	53 3	49 6
1906	53 9	50 1	48 1	48 8	50 2	50 3	50 6	53 0	54 6	56 8	58 6	62 4	53 6
1907	60 4	56 6	54 10	56 0	61 1	58 1	57 8	57 8	55 7	54 8	50 8	50 0	56 2
1908	48 5	49 3	51 7	51 10	51 6	51 2	50 0	51 4	52 0	49 8	49 4	48 11	50 8
1909	48 10	48 1	46 9	47 9	48 4	48 9	48 6	50 5	51 3	51 11	51 2	50 7	49 4
1910	51 10	51 3½	51 7½	50 10	49 10	49 2	48 10	49 8½	49 3½	49 7½	49 8½	49 10	50 4
1911	49 11½	49 2½	48 5	46 11	46 4	46 6	46 11½	47 4	47 0	46 7	47 4½	48 1	47 7
1912	50 0	49 5½	51 1½	53 7½	54 4	55 1	57 5½	64 6½	61 7½	66 8½	67 8	58 0	58 5½
1913	66 11½	63 8½	64 8	67 1½	66 3	56 9½	56 3½	55 8	55 4	53 0	50 1	50 4	58 10
1914	50 11	51 5½	51 0½	51 4½	51 3	51 6½	51 5	52 3	51 5	50 1	50 3	53 0	51 4½
1915	55 7	56 6	61 0	66 7	65 2	66 10	65 4	66 0½	65 3	65 11	69 10½	75 7½	65 7
1916	80 2	91 6	87 4½	86 10	82 6	82 6	87 6	87 6	87 6	87 6	87 6	87 6	85 10
1917	87 6	87 6	87 6	92 6	92 6	92 6	92 6	92 6	92 6	92 6	92 6	95 0	90 3
1918	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0
1919	95 0	95 0	95 0	95 0	152 6	160 0	160 0	160 0	160 0	160 0	160 0	160 0	137 8
1920	175 0	175 0	187 6	200 0	208 0	217 6	217 6	221 0	225 0	225 0	225 0	225 0	209 3
1921	222 6	195 0	150 0	126 0	120 0	120 0	120 0	136 3	127 0	120 0	110 0	100 0	137 4
1922	92 6	90 0	90 0	90 0	90 0	90 0	89 0	87 3	92 6	92 6	92 6	91 3½	90 7½
1923	94 6	108 9	125 6	129 4½	128 5	136 0	128 1½	121 11	97 1½	97 0	100 0	100 0	110 6½
1924	99 10	97 3½	91 9	93 9	91 9	89 10½	87 9	85 0	82 5½	80 2½	81 9	81 9	88 7½
1925	80 4½	78 10½	78 0	78 3	76 0	73 10½	71 7½	69 10½	68 1½	66 7½	66 0	66 10½	72 10½
1926	69 4½	70 0	70 0	70 0	72 6	75 10½	86 7½	90 0	92 10½	117 10	120 0	99 0	86 3
1927	85 0	83 1½	81 0	80 0	73 9	70 0	70 0	68 9	67 6	67 6	66 10½	65 0	73 2½
1928	65 0	65 0	65 6	66 0	66 0	66 0	66 0	66 0	66 0	66 0	66 0	66 0	65 0½
1929	66 0	66 9	67 0	68 1½	69 5	71 10½	72 9	72 6	72 6	72 6	72 6	72 6	70 4½
1930	72 6	72 6	70 0	67 6	67 6	67 6	67 6	64 6	63 6	63 6	63 6	63 6	66 11½
1931	59 6	58 6	58 6	58 6	58 6	58 6	58 6	58 6	58 6	58	58 6	58 6	58 7
1932	58 6	58 6	58 6	58 6	58 6	58 6	58 6	—	—	—	—	—	—

WILLIAM JACKS & COMPANY,

WINCHESTER HOUSE, OLD BROAD ST., LONDON, E.C.2.

CLARENCE CHAMBERS, 39, CORPORATION STREET, BIRMINGHAM.

13, RUMFORD STREET, LIVERPOOL.

PIG

IRON

All grades FOUNDRY, HEMATITE, BASIC, SPECIALS, &c.

NON-FERROUS METALS

COPPER, TIN, LEAD, SPELTER, ANTIMONY, CHROME ORE.

WILLIAM JACKS & COMPANY,

CENTRAL CHAMBERS, 93, HOPE ST., GLASGOW, C.2.

ZETLAND ROAD, MIDDLESBROUGH.

SMALL ADVERTISEMENTS.

Notice.

Small Advertisements in this section of the Journal are accepted at the prepaid rate of 6d. per line, first line in capitals counting two, average 6 words per line. Minimum charge for one insertion 3/-

(A remittance should accompany instructions.)

SITUATIONS WANTED.

WANTED, position as Marker-Out Inspector; over 25 years' experience, last 3½ years foundry. A sound knowledge of trigonometry and workshop practice. London district or South preferred.—For further information apply, Box 230, Offices of The Foundry Trade Journal, 49, Wellington Street, Strand, London, W.C.2.

EMPLOYMENT REGISTER.

Conducted by the Institute of British Foundrymen by courtesy of the proprietors of The Foundry Trade Journal.

Correspondence should be addressed to the General Secretary, Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester, from whom full particulars can be obtained of this service.

Any employer wishing to communicate with a candidate should write to the General Secretary, quoting identification number.

PRACTICAL Foundryman, disengaged; last position 13 years, full control; sound experience in Marine Work of all descriptions; dock repairs a speciality, also Lanz process, requires suitable position at home or abroad. (188)

EXPERIENCED and well-known Foundry Manager is open to consider new engagement. Has had complete control of large foundries engaged in all branches of ironfoundry work, from small repetition work to castings of 50 tons. (189)

PARTNERSHIP.

WELL-KNOWN Foundry has vacancy for Director, either on practical or commercial side. Please state qualifications *re* ability and investment.—Box 240, Offices of The Foundry Trade Journal, 49, Wellington Street, Strand, London, W.C.2.

PATENT.

THE Inventor of British Patent No. 288890, relating to Cupola Blackheart Malleable Process, producing low-carbon iron, sound castings any thickness, test on ⅝ in., 10 to 15 per cent. elongation; great savings; successfully applied in England by the Wycliffe Foundry Company, Limited, since 1927, as well as in France, Belgium, is desirous to sell his 50 per cent. rights in the Patent.—All inquiries to be addressed to: Ets D. K. P. Chaumont (Hte. Marne), France.

PROPERTY.

MAGNIFICENT

11 ACRES WORKS SITE.

SHEFFIELD.

145,000 Sq. Ft. of Shops.

SIDING CONNECTIONS

with L.M. & S. and L. & N.E. Rlys.

WELL-BUILT & COMMODIOUS OFFICES

Will Sell whole or in lots to suit customers or Let on favourable terms. Unique opportunity for Manufacturers.

Apply—

THOS. W. WARD, LTD.,

ALBION WORKS, SHEFFIELD.

MACHINERY.

WANTED, Sand Slinger, portable type, not later than 1928.—Reply, Box 238, Offices of The Foundry Trade Journal, 49, Wellington Street, Strand, London, W.C.2.

WANTED, Cupola, about 3 ft. 6 in. inside dia. of shell. Please state lowest price and full particulars.—Box 236, Offices of The Foundry Trade Journal, 49, Wellington Street, Strand, London, W.C.2.

AUCTION LOTS!

TILGHMAN Sandblast Room, size 15 ft. x 12 ft., as new, with all equipment.

TILGHMAN Rotary Sandblast Plant, scarcely used, about 30 cwts. castings per hr. capacity.

MACDONALD Plain Jolt-Ram Machine, 6-ft. square table, to bump up to about 9 tons. Cheap to clear; lying at Bedford.

A. Hammond, Foundry Machinery Merchant. 'Phone: 287 Slough.

S. C. BILSBY, A.M.I.C.E., A.M.I.E.E.

Carries a large stock of **FOUNDRY PLANT** which, generally, includes:—

Power and Hand Moulding Machines, Sand Mills and Disintegrators, Sand Blast Plants, Ladles, Melting Furnaces, Grinding Machines, Blowers and Exhaust Fans, Air Compressors, etc., etc.

Also 300 A.C. and D.C. Electric Motors, ¼ to 200 h.p., and Generators, to suit most systems.

All at low prices. Please send your inquiries to:—

215, BARCLAY ROAD, WARLEY,
Nr. Birmingham.
'Phone: Bearwood 1103.

WORKS ADDRESS: Crosswells Road (next G.W.R. level crossing), Langley, near Birmingham. 'Phone: Broadwell 1359.

THOS. W. WARD, LTD.

Rumbler, 15′ x 4′ x ¼″ thick.

Pneumatic Sand Moulding Machine, boxes 16″ x 16″ x 6″.

Geared Foundry Ladle, hand operated, 20″ deep x 23″ dia. at top. At Silvertown.

Worthington Duplex Boiler Feed Pump, 6″ x 4″ x 6″.

BABCOCK W.T. BOILER, 300 lbs. w.p.

ALBION WORKS, SHEFFIELD.

'Grams: Forward, 'Phone, 23001 (10 lines.)

"Albion" Catalogue on application.

MISCELLANEOUS.

IRON CASTINGS.—Modern well-equipped foundry in the North desires arrangement for manufacture of special castings—light or heavy. Would purchase or lease patent rights or under suitable agreement would install specialised plant for mass production.—Apply, Box 228, Offices of The Foundry Trade Journal, 49, Wellington Street, Strand, London, W.C.2.

OUR DEXTRIN CORE GUM, reliable strength, has a reputation all over England as well as abroad. Please post us your inquiry, stating quantity, for carriage-paid terms.—William Olsen, Limited, The Foundry Suppliers, Hull.

P.P.P.P. stands for our PERFECT PEERLESS PARTING POWDER. Cheapest and best. Always ready in casks or paper-lined bags (free), carriage paid any distance.—William Olsen, Limited, The Foundry Suppliers, Hull.

PUBLICATION.

RYLAND'S DIRECTORY of the Coal, Iron, Steel, Tinplate, Metal, Engineering, Hardware and Allied Trades. 1932 edition. Now ready. Price 42s., bound in cloth.—Industrial Newspapers, Ltd., 49, Wellington Street, Strand, London, W.C.2.

'Phone: 287 SLOUGH

LADLES—GEARED

12-Ton "Stevenson"	... ...	£48
9-Ton "MacNeil"	... ...	£42
4-Ton "Evans"	... ...	£28
3-Ton "Evans"	... ...	£24
2-Ton "Evans"	... ...	£19

PNEUMATIC MACHINES

18″×18″ Tabor split pattern	£45
30″×40″ Tabor rollover ...	£160
No. 2 Britannia Jolters	... 2 @ £36
No. 0 Britannia Jolters	... 4 @ £20
Core Jolters, 3″ Cylinder new,	£4 each

ABOVE ARE AS NEW.

BUY FROM ME AND SAVE MONEY!

Alex. HAMMOND, *Foundry Machinery Merchant,*
14, AUSTRALIA ROAD, SLOUGH

Bradley's

REFINED ALLOY IRONS

A new range of compositions containing varying proportions of Nickel, Chromium, Vanadium, Titanium, etc., suitable for wear and corrosion resistance, castings required to withstand high temperature, acid resistance and for high strength, toughness and resilience qualities. The use of Alloy Pig Irons ensures homogeneous castings, avoids segregation and ladle losses and gives 100% benefit from alloy additions.

BRADLEY & FOSTER LIMITED
DARLASTON BLAST FURNACES,
DARLASTON, STAFFS

Telephone: Darlaston 16 (P.B. Ex.) Telegrams: "Bradley's, Darlaston."

PETER—WITH ONE EXCEPTION

With one exception Peter is an ordinary little fellow. Chubby, likeable, just five-and-a-half, full of life and fun, and on occasions—be it admitted—of naughtiness. Just now Peter's rather important, for this is his first term at school, and he's grappling with the intricacies of "A B C" and "Twice-Two": difficult subjects to all men of five-and-a-half, but even more difficult in Peter's case because—bad luck—he's totally blind. That's his One Exception. Peter learns reading, writing, and 'rithmetic through the medium of "Braille"—dull stuff compared with the coloured picture books of most five-and-a-halfs. However, he's a stout lad is Peter, and he's making great progress.

Would you like to know more about him? How, in spite of his "One Exception," he is being educated and, when older, technically trained and usefully employed.

There is a long waiting list of "Peters" throughout the British Isles, for whom training and accommodation must be provided in the immediate future.

Will you help with a donation or annual subscription? Any sum, large or small, will be gratefully received.

Here's a suggestion. Your eyesight is worth 3d. a year to you. Send Peter and his handicapped pals 3d. for every year you've had it. Now, please, in case it slips your memory. Good idea?

The Chairman,

SCHOOL FOR THE BLIND
(Founded 1833)
SWISS COTTAGE, LONDON, N.W.3